

# JOURNAL *of the* American Veterinary Medical Association

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The American Veterinary Medical Association



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FARMING as a consistently profitable enterprise is the high hope and purpose behind tremendous governmental powers embodied in the Farm Relief Act of the recent Congress.

IN correlation thereto should be accorded generous recognition of veterinary service as a factor in stabilizing farm values.

THE CORN STATES SERUM CO.  
OMAHA, NEBRASKA







# **JOURNAL**

*of the*  
**American Veterinary Medical Association**  
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(Original Official Organ U. S. Vet. Med. Assn.)

H. Preston Hoskins, Secretary-Editor, 1230 W. Washington Blvd., Chicago, Ill.

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AUGUST, 1933

No. 2

## **ON TO CHICAGO**

The 1933 convention is now only about two weeks away. Plans are now practically complete for what may turn out to be the largest meeting in the history of the A. V. M. A. In some respects it has been rather difficult to plan for the convention this year. The reasons probably would not be apparent to the casual observer, but those on whose shoulders the responsibility has rested the past year are familiar with the facts. As such things go, twenty-four years is a long time. That is the interval that has elapsed since the A. V. M. A. met in Chicago—in 1909. The organization has grown in size, scope and influence during this quarter of a century. From what used to be comparatively simple affairs, our meetings have grown and expanded to a point where they are looked upon as big events, much sought after each year by practically all of the large cities and many of the smaller ones. Unfortunately, those agencies which do the most aggressive seeking are rarely the ones on which the burdens of a convention finally fall. And right here is a problem pressing for solution. What, if anything, should be done to keep A. V. M. A. conventions from becoming unnecessarily burdensome, financially and otherwise, to the group of local veterinarians on whom many of the responsibilities of a convention fall under

present conditions? This year Chicago has tried, in part at least, to solve this problem.

On to Chicago! Attend the 70th annual convention of the A. V. M. A. and see A Century of Progress. The week of August 13 probably will be the biggest week in Chicago this summer.

### WHO SHOULD PLAN VETERINARY EDUCATION?

The JOURNAL recently announced that the University of Georgia would not continue the course in veterinary medicine after the close of the 1932-33 session. Without in any way intending to express an opinion on the wisdom, or otherwise, of this action, we do desire to point out what appears to be a weakness in the present system of veterinary education.

If one state decides to eliminate the expense of maintaining a veterinary college, what is to stop any other state, or a number of them, from doing the same thing? The past year has seen some major operations performed on state budgets. Without a doubt heroic treatment was indicated as the only means of saving the patients in some cases, but calm reflection raises serious question as to the advisability of some of the operations (amputations, in some cases) performed during the emergency.

A state without a veterinary college must depend for veterinarians on what might be termed the "educational generosity" of those states that do support veterinary education. There are now ten such states. Thirty-eight states provide nothing toward veterinary education. If a young man in one of these states wants to acquire a veterinary education, he is obliged to go to one of the ten states where there is a veterinary college. He pays the fees required—in practically all cases these do not cover the cost of his veterinary education—and the state makes up the difference. His course completed, the young veterinarian returns to his native state and starts the practice of his profession. How long are the ten states going to carry the load for the entire country?

It may be argued that most of the states could not support a veterinary college adequately. It is well that they can not. If each state could and did support one, there would be a big surplus of something—either veterinary colleges or veterinarians. No, we probably have enough veterinary colleges. The weak spot appears to be in the distribution of the burden of the cost of veterinary education. Why should a state with the agricultural wealth of Illinois be dependent on other states for supply-

ing veterinarians? Or Indiana, or Wisconsin, or Minnesota, or Nebraska?

Although we do not usually think of the New England States as constituting an agricultural district, nevertheless there are millions of dollars invested in live stock in these six states and approximately 500 veterinarians are required to safeguard the health and well-being of these animals. Yet, New England has been without a veterinary college for over thirty years and during this period—practically a generation—the six states have not spent a penny on veterinary education.

Whose function is it to safeguard the future of veterinary education? What individuals or what groups or what interests should be thinking and planning for the years ahead? Veterinary education in the United States has developed without any centralized planning or supervision in the real sense. There have been a few outstanding veterinary educators who have blazed the trail, but, it must be acknowledged, veterinary education has suffered from a lack of anything in the shape of proper supervision and coordination. Outside of a few instances of individual effort, there has been almost a complete absence of anything suggestive of long-time planning. Practically without exception, veterinary education today is subject to the caprice or whims of state legislatures, with constantly changing personnel, and all too frequently a very evident lack of a sympathetic understanding or appreciation of the value of veterinary medicine.

Should not those states which make no direct financial contribution to veterinary education be encouraged to provide scholarships in established veterinary colleges? The income from these scholarships could be used to good advantage by any of the existing institutions. The money would go much further under some such plan, than if used by the 38 states having no colleges, in any attempt to start new ones. About the only other alternative would be some system of federal aid made directly for veterinary education. Whether this is desirable, over any other plan, is open to question.

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## TWO LETTERS START SOME THOUGHTS

Two letters crossed our desk recently, within a space of less than twenty-four hours. These letters were in no way related and were but a part of the grist of correspondence of a busy office. Each letter contained a sentence relative to the state

board examinations recently held in the widely separated states of the respective writers. It was a comparison of the two statements, when laid side by side, that arrested our attention and started a train of thoughts.

On July 13, the Virginia State Board of Veterinary Medical Examiners met at Fredericksburg and gave examinations to eight veterinarians who were seeking the right to practice in the Old Dominion. Four days later, examinations were held in Chicago, for applicants for licenses to practice in Illinois. There were six applicants, two being non-graduates, who are eligible under the Illinois statute. Six months ago, when the time arrived for holding the regular semi-annual examination in Illinois, it was postponed because there was but one applicant. Illinois normally should have approximately ten times as many veterinarians as Virginia. Why should there be twice as many veterinarians seeking licenses to practice in Virginia as in Illinois?

During recent years, Illinois has received some very unfavorable advertising, especially in relation to the unattractiveness of veterinary practice, brought about by several unfair forms of competition carried on by certain organizations in the State. Illinois has no veterinary college and has had none for thirteen years. Therefore, she must depend upon institutions located in other states to supply her needs as far as new veterinarians are concerned. When the time arrives for a new graduate to look around, for the purpose of surveying the advantages and disadvantages of various locations, he is very likely to pass up Illinois.

This situation has developed through no fault of the veterinarians already in the State, but the blame must be laid at the doors of certain organizations that have not only done nothing to make veterinary practice inviting, but they have actually done many things to discourage veterinarians and even drive them out of the State. With a potential need for a thousand veterinarians to look after the needs of the live stock industry of Illinois, and new veterinarians coming into the State at the rate of only four per year, it does not take very much of a mathematician to figure out what the veterinary situation in Illinois will be a very few years hence.

Here is another slant on the situation, taken from a different angle, but it tells the same story. Illinois, one of the most important agricultural states in the Union, and containing the second largest city in the country, with its needs for various forms of veterinary service, requires about one-tenth of the veterinarians actively engaged throughout the United States. At the

1933 commencement exercises of the eleven veterinary colleges, there were 223 veterinarians graduated. Theoretically, and under normal average conditions, Illinois should have attracted at least twenty of the 1933 crop of new veterinarians. If the estimated requirements of the country as a whole are used as the basis for computation, Illinois should absorb about thirty new veterinarians each year.

It should be kept in mind that there are several factors which may influence these calculations slightly, one way or the other. There are some who believe that there has been an oversupply of veterinarians in Illinois at times in the past. If this is true, the excess certainly has been reduced materially during recent years. Then, it may be claimed that state-board figures may not be a reliable index of acquisitions. All applicants do not pass and, of those who do pass, all do not locate in the state where the examination has been taken. On the other hand, to offset the foregoing condition, a state may secure additional veterinarians who do not go before the state board. We have in mind those men who are employed in branches of the profession other than practice.

No matter what figures are taken, or what the arguments are, it can not be denied that Illinois will need more than four new veterinarians per year, to replace normal losses. In the absence of a veterinary college, Illinois must depend on other states to supply her demand. Veterinarians will not locate in Illinois as long as conditions elsewhere are more attractive. It is within the powers of the organized agricultural interests of Illinois to improve conditions in the State, with a view to attracting the highest grade of veterinary service to the State. Losses from animal diseases resulting from an insufficient veterinary service fall most heavily upon the owners of the animals. Indirectly everybody helps to pay the bill. Veterinarians, therefore, are not the sole beneficiaries when employed to prevent or reduce losses from animal diseases, as some would believe. Temporarily, established veterinarians suffer from reduced income when they are not employed to perform services that rightfully are theirs to render. In the long run, however, animal industry in particular, and the public in general, will be the heaviest losers.

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Theodore Roosevelt once said: "There never has been a man in our history who led a life of ease whose name is worth remembering."

# EXHIBITORS AT THE

ABBOTT LABORATORIES, North Chicago, Ill.  
Pharmaceuticals

ALLIED LABORATORIES, Kansas City, Mo.  
Anti-hog cholera serum

BATTLE CREEK DOG FOOD CO., Battle Creek, Mich.  
Health food for dogs

BECTON DICKINSON CO., Rutherford, N. J.  
Syringes, thermometers

CHAPPEL BROTHERS, Rockford, Ill.  
Ken-L-Ration products

CORN STATES SERUM CO., Omaha, Neb.  
Anti-hog cholera serum

CUTTER LABORATORY, Berkeley, Calif.  
Biologicals

DENVER CHEMICAL MFG. CO., New York, N. Y.  
Antiphlogistine

ALEXANDER EGER, Chicago, Ill.  
Books

FORT DODGE LABORATORIES, Fort Dodge, Iowa  
Biologicals and pharmaceuticals

GENERAL ELECTRIC CO., Chicago, Ill.  
X-ray equipment

HAYER-GLOVER LABORATORIES, Kansas City, Mo.  
Biologicals and pharmaceuticals

JENSEN-SALSBERY LABORATORIES, Kansas City, Mo.  
Biologicals and pharmaceuticals

Palmer House—Chicago

# A. V. M. A. CONVENTION

LEDERLE LABORATORIES, New York, N. Y.

Biologicals

LEPEL HIGH FREQUENCY LABORATORIES, INC., New York, N. Y.

Electrical equipment

ASHE LOCKHART, INC., Kansas City, Mo.

Biologicals

NORDEN LABORATORIES, Lincoln, Neb.

Biologicals and pharmaceuticals

JOHN OSTER MANUFACTURING Co., Racine, Wis.

Clipping machines

E. J. PAIDAR Co., Chicago, Ill.

Operating tables

PITMAN-MOORE Co., Indianapolis, Ind.

Biologicals and pharmaceuticals

RARE CHEMICALS, INC., Nepera Park, N. Y.

Azamine

SHARP and SMITH, Kansas City, Mo.

Instruments

SHIKLES BROS. MFG. INC., Dearborn, Mo.

Instruments, equipment

R. J. STRASENBURGH Co., Rochester, N. Y.

Pharmaceuticals

SWIFT and COMPANY, Chicago, Ill.

"Pard" dog food

WILSON and COMPANY, Chicago, Ill.

"Ideal" dog food

August 14-15-16-17-18



### ADDITIONAL PROGRAM

The following papers will be presented at the Chicago convention, in addition to those listed in the July issue of the JOURNAL: What About Veterinary Education?—Dr. C. H. Stange, Iowa State College, Ames, Iowa.

Economic Aspects of Veterinary Medicine—Dr. J. R. Mohler, Chief, U. S. Bureau of Animal Industry, Washington, D. C.

Veterinary Medicine in the United States Prior to 1850—Dr. Joseph M. Arburua, San Francisco, Calif.

The Significance of Traumatized Tissue Response to the Ultra-violet Rays (To be read by title)—Dr. N. G. Covington, Washington State College, Pullman, Wash.

Investigation of a Disease in Young Pigs—Dr. C. N. McBryde, U. S. Bureau of Animal Industry, Ames, Iowa.

Notes on the Experimental Transmission of Bovine Anaplasmosis in Florida—Dr. D. A. Sanders, Florida Agricultural Experiment Station, Gainesville, Fla.

Municipal Food Inspection—Dr. J. S. Koen, Department of Public Welfare, Saint Louis, Mo.

A Study of the Comparative Value of Fowl-Pox Virus and Pigeon-Pox Virus Vaccines for Immunization Against Fowl-Pox (To be read by title)—Drs. R. E. Lubbehusen and D. P. Ehlers, Pennsylvania Bureau of Animal Husbandry, Harrisburg, Pa.

The Chemical Characters of the Blood and Urine of Colts (Change in title)—Drs. W. W. Dimock and D. J. Healy, University of Kentucky, Lexington, Ky.

Significance of Additional Information Concerning Hog Cholera (Change in title)—Dr. C. H. Stange, Iowa State College, Ames, Iowa.

Contagious Ecthyma (Sore Mouth) of Sheep—Dr. I. B. Boughton, Texas Agricultural Experiment Station, Sonora, Texas.

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The health exhibits at A Century of Progress are the best the world has to offer. The exhibits, which are in the Hall of Science, show graphically the remarkable progress of medical science over a comparatively brief span of years.

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If you do not want to call it "A Century of Progress" while in Chicago, just say "Centriprog." That's the official nickname.



## THREE MORE CHANGES

Dr. R. M. Gow (O. S. U. '09), of Denver, Colo., has been appointed the veterinary member of the Colorado State Board of Stock Inspection Commissioners, recreated by the so-called Code Bill, passed by the Colorado legislature several months ago. (See JOURNAL, May, 1933, p. 684.) Dr. Gow formerly was State Veterinarian of Arkansas, before going to Colorado about ten years ago. Dr. Chas. G. Lamb (Mont. '85) was State Veterinarian of Colorado prior to the change.

Dr. George E. Corwin (U. S. C. V. S. '03), who has been located in Boston, Mass., for the past four years, as Assistant Director of the Division of Animal Industry, Massachusetts Department of Conservation, has accepted appointment as Deputy Commissioner on Domestic Animals in Connecticut, a position he held from 1921 until 1929.

Dr. H. C. Rinehart (McK. '11), of Rushville, Ill., has been appointed Chief Veterinarian, Illinois Division of Animal Industry, by Governor Horner. Dr. Rinehart, who has been engaged in private practice, succeeds Dr. W. H. Welch (Chi. '92), who held the office since his appointment in 1929.

## APPLICATIONS FOR MEMBERSHIP

(See July, 1933, JOURNAL)

## FIRST LISTING

- BRANIGAN, CHESTER P. 10759 Washtenaw Ave., Chicago, Ill.  
M. D. C., Chicago Veterinary College, 1907  
Vouchers: Edward Himself and John Dickson.
- CASE, RALPH W. Box 1286, Prescott, Ariz.  
B. S., D. V. M., Washington State College, 1932  
Vouchers: G. W. McNutt and J. C. McGrath.
- COLLINS, GEORGE L. Stanton, Neb.  
D. V. M., Iowa State College, 1933  
Vouchers: L. Collins and C. H. Stange.
- COX, NORMAN H. 264 S. Main St., Rutland, Vt.  
B. V. Sc., Ontario Veterinary College, 1929  
Vouchers: G. N. Welch and C. M. Miller.
- CRAVER, THOMAS W. 234—5th Ave., Youngstown, Ohio  
D. V. M., Ohio State University, 1929  
Vouchers: Walter R. Krill and O. V. Brumley.
- GRANHOLM, PAUL R. 605 N. 13th St., Milwaukee, Wis.  
D. V. M., Iowa State College, 1932  
Vouchers: Cecil Houston and Howard B. Fishback.
- KIGHT, A. B. 324 S. Kimball St., Casper, Wyo.  
D. V. M., Colorado Agricultural College, 1932  
Vouchers: W. A. Sullivan and C. E. Wilmot.
- LENHEIM, EDWARD H. 326 City Building, Topeka, Kan.  
D. V. M., Saint Joseph Veterinary College, 1916  
Vouchers: C. B. Clement and A. Kushner.

- MUNN, URTON Tallassee, Ala.  
 D. V. M., Alabama Polytechnic Institute, 1933  
 Vouchers: C. A. Cary and I. S. McAdory.
- TENNILLE, NEWTON B. Wapakoneta, Ohio.  
 D. V. M., Ohio State University, 1933  
 Vouchers: J. N. Shoemaker and W. F. Guard.
- WOLF, HERMAN H. 1713 W. Slauson Ave., Los Angeles, Calif.  
 D. V. S., Western Veterinary College, 1901  
 Vouchers: John F. McKenna and C. A. White.

### Applications Pending

#### SECOND LISTING

(See July, 1933, JOURNAL)

- Bartlett, Fred L., 8301 S. Sangamon St., Chicago, Ill.  
 Brundage, Harold S., 7417 Stony Island Ave., Chicago, Ill.  
 Butler, Walter C., 1813 Belmont, Fort Worth, Texas.  
 Gallivan, Frank M., Globe Laboratories, Fort Worth, Texas.  
 Grutzman, Major Walter R., Box 502, Alachua, Fla.  
 Kline, Albert J., Wauseon, Ohio.  
 McClead, Forrest, R. 4, Alexandria, Ind.  
 McKittrick, John L., Station B, R. 1, Columbus, Ohio.  
 Markle, William M., West Newton, Pa.  
 Miller, Shefford S., 300 Webster Ave., New Rochelle, N. Y.  
 Pinney, Freeman, 6421 Harper Ave., Chicago, Ill.  
 Ricks, Daniel H., Pauls Valley, Okla.  
 Smith, Kenneth F., 2129 Peasley St., Columbus, Ohio.  
 Trussell, William E., Charles Town, W. Va.  
 Webb, Harold A., 7417 Stony Island Ave., Chicago, Ill.

The amount which should accompany an application filed this month is \$7.08, which covers membership fee and dues to January 1, 1934, including subscription to the JOURNAL.

### COMING VETERINARY MEETINGS

- Connecticut Veterinary Medical Association. Bridgeport, Conn.  
 August 2, 1933. Dr. Edwin Laitinen, Secretary, 993 N. Main St., West Hartford, Conn.
- Poultry Science Association. Michigan State College, East Lansing, Mich. August 2-5, 1933. Professor C. G. Card, General Chairman, East Lansing, Mich.
- San Diego-Imperial Veterinary Medical Association. San Diego, Calif. August 2, 1933. Dr. A. P. Immenschuh, Secretary, Santee, Calif.
- Hudson Valley Veterinary Medical Society. Rhinebeck, N. Y.  
 August 9, 1933. Dr. J. G. Wills, Secretary, Box 751, Albany, N. Y.
- Tulsa County Veterinary Association. Tulsa, Okla. August 10, 1933. Dr. J. M. Higgins, Secretary, 3305 E. 11th St., Tulsa, Okla.

- American Veterinary Medical Association. Palmer House, Chicago, Ill. August 14-18, 1933. Dr. H. Preston Hoskins, Secretary, 1230 W. Washington Blvd., Chicago, Ill.
- Interstate Veterinary Medical Association. Elks Building, Omaha, Neb. August 14, 1933. Dr. G. L. Taylor, Secretary, Plattsmouth, Neb.
- Wisconsin Veterinary Medical Association. Palmer House, Chicago, Ill. August 15, 1933 (1:00 p. m.). Dr. B. A. Beach, Secretary, Madison, Wis.
- Illinois State Veterinary Medical Association. Palmer House, Chicago, Ill. August 15, 1933 (7:00 p. m.). Dr. J. V. Lacroix, Acting Secretary, 1817 Church St., Evanston, Ill.
- Kansas City Veterinary Association. Baltimore Hotel, Kansas City, Mo. August 15, 1933. Dr. J. D. Ray, Secretary, 1103 E. 47th St., Kansas City, Mo.
- Southern California Veterinary Medical Association. Chamber of Commerce Building, Los Angeles, Calif. August 16, 1933. Dr. T. G. Beard, Secretary, 3684 Beverly Blvd., Los Angeles, Calif.
- Fifth World Poultry Congress. Trajan's Markets, Rome, Italy. September 6-15, 1933. Comitato del V Congresso Mondiale di Pollicoltura, Ministero dell' Agricoltura delle Foreste, Roma, Italy.
- New York City, Veterinary Medical Association of. Academy of Medicine, 5th Ave. and 103rd St., New York, N. Y. September 6, 1933. Dr. John E. Crawford, Secretary, 708 Beach 19th St., Far Rockaway, Long Island, N. Y.
- Chicago Veterinary Medical Society. Hotel LaSalle, Chicago, Ill. September 12, 1933. Dr. O. Norling-Christensen, Secretary, 1904 W. North Ave., Chicago, Ill.
- Southeastern Michigan Veterinary Medical Association. Detroit, Mich. September 13, 1933. Dr. A. S. Schlingman, Secretary, Parke, Davis & Co., Detroit, Mich.
- International Association of Dairy and Milk Inspectors. Hotel Claypoole, Indianapolis, Ind. October 12-14, 1933. Dr. Paul B. Brooks, Secretary, Deputy Commissioner of Health, New York State Department of Health, Albany, N. Y.
- Twelfth International Veterinary Congress. New York, N. Y. August 13-18, 1934. Dr. H. Preston Hoskins, General Secretary, 1230 W. Washington Blvd., Chicago, Ill.

## ETHICAL COMMERCIALISM\*

By I. M. HAYS, Auburn, Ala.

*Alabama Polytechnic Institute*

The purpose of this paper is to attempt to promote unity in the ranks of the practitioners of our profession, and to discuss briefly and frankly a subject that is of vital interest to all of us. I have no interest whatever in any commercial organization and my views are strictly impartial.

The results of unethical commercialism are only too apparent in all sections of the country. There is no use discussing the various types of parasites that invade our field; all of you who practice are sadly familiar with them. Each section of the country has its own particular empirical agency; some sections have many. It is a most fortunate thing that we still have a few commercial houses which sell their products only to the profession. I hesitate to think what would happen to the practitioner should they be unable further to support him. The men at the head of these houses spend many dollars each year to uphold their policy of selling only to the profession and they are truly backing up the qualified veterinarian. They believe in him, and he, in turn, should reciprocate with his support. In every case, it will be found that the products of the ethical houses are of the highest quality and will give the maximum results if they are properly applied. These concerns should be represented to our public through us.

On the other hand, the bad results of unethical commercialism are rapidly growing. Firms which sell their products to anybody who wishes to buy them far outnumber the ethical houses. In some sections of our country, several stocks of veterinary supplies are kept in each town, and they include a full stock of biologics and patent medicines. Some of these products may be very good, but any good treatment when injudiciously given may do harm. This not only robs the local practitioner of what rightfully belongs to him, but it gives our entire profession adverse publicity because of the fact that the ordinary layman still has the idea that almost anybody who wishes to dabble in veterinary work is as well qualified as the graduate, licensed veterinarian.

Too much cannot be said about the control of the sale of veterinary supplies, especially biologics. I know of one instance of a town of five thousand inhabitants in the South, in which three drug-stores carry a full line of veterinary supplies. One of these

\*Presented at the sixty-ninth annual meeting of the American Veterinary Medical Association, Atlanta, Ga., August 23-26, 1932.

stores sold in one year 65,000 doses of biologics, chief of which were products for the prevention of blackleg and hemorrhagic septicemia. In that town there also was a graduate veterinarian who, that same year, used a total of 500 doses. Not long ago, in a county in central Illinois, a local paper printed the prices of anti-hog cholera serum and virus, and listed the prices of vaccinating instruments. It called attention to the fact that the local farm agency had all the necessary veterinary supplies and was prepared to give expert advice, although it had no veterinarian on its staff.

There is no one single agency which promotes empirical pill-shooters and quack shops and allows them to prosper, so much as the unethical commercial house. Personally, I believe the time is at hand when veterinarians all over the United States must separate the sheep from the goats in the matter of veterinary supplies. It is possible, also, that the production of biological products should be hedged about by even more rigid inspection provisions than those now in effect. I think it worthy to recommend to A. V. M. A. members that both the national and state associations bring carefully planned pressure to bear on agricultural and political leaders, relative to the sale and distribution of live viruses and vaccines to untrained laymen. Only a campaign of education, and not of force, can bring about a transformation of public opinion on a matter of this kind.

With full coöperation from the practicing veterinarians, I believe the time soon will come when the ethical commercial companies will work with each other a little better, will be a little less selfish, and will pool their efforts in an advertising campaign for the benefit of veterinarians. It would seem logical if these companies could standardize on a common trade-mark which would signify quality and high standards of production to both veterinarians and laymen.

It has been and still is the custom for practicing veterinarians to sit by quietly, take whatever business comes along, and then expect to collect a fee purely because of professional service rendered. The old idea of ethics among practitioners is somewhat outgrown. The modern veterinarian should display to the public the double-edged weapon of (1) qualified professional service and (2) a line of high-class drugs and biologics which are well advertised and which cannot be purchased at any crossroads drug-store. As a general rule, the vast quantity of veterinary supplies that are sold to laymen annually are sold because of two reasons—a very low cost and a large amount of propaganda. They are not sold because of any merits of their own.

The companies which market their products, including serum and virus, directly to the public have waxed fat at the expense of the ethical companies, and it is a sad truth that a large part of their success has been due to the negative, and sometimes positively favorable, attitude on the part of the veterinary profession. If the rank and file of veterinarians are interested only in the matter of price, regardless of the business policies of the companies with which they deal, then they may eventually force the ethical companies to let down the bars and sell to anybody who has the price.

It cannot be said that outside agencies are to blame entirely for the situation which we face today. It has been charged that many veterinarians are not well qualified. Without doubt, this accusation is true, but many of them recognize their limitations and stay within them. Our schools have seen the need and have increased their requirements accordingly, thus assuring a high-class veterinarian for the future. Another serious situation lies in the great difference in the matter of fees. Often the client assumes the attitude that if the veterinarian cannot show the farmer a profit from his call, then he can get along without him. In a sense, that is true.

In answer to a questionnaire sent to 157 Iowa veterinarians, on the cost of vaccinating 100 head of 60-pound pigs with serum and virus, it was found that the low man charged \$24 and the high man, \$49. A second question asked what the charge would be to vaccinate calves against blackleg. The low man quoted 10 cents a head plus his trip, and the high man charged 50 cents a head plus mileage. It is evident, then, that we have discrepancies in fees charged, ranging from 100 to 500 per cent. Surely, we should be fair-minded, take notice of the ever-changing economic situation, and act accordingly.

I have unbounded faith in our profession. No other professional group has made so much progress in the past five or ten years, and it is up to us to see that we receive just recognition by the public. We have a few powerful agencies working for our mutual good, and not the least of these is the ethical commercial house. Let us wake up, recognize the good these companies are doing, stand solidly behind them, and show our faith in them, as they have kept faith with us.

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There is a moral to be found in this recent newspaper advertisement: "Model A Ford in exchange for a mule." The pendulum swings back.



## SOME OBSERVATIONS ON THE PATHOLOGY OF JOHNE'S DISEASE\*

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### INTRODUCTION

Since the recognition of the acid-fast bacillus of Johne's disease by Johne and Frothingham,<sup>1</sup> in 1895, and the observation of the same organism in this country by Leonard Pearson,<sup>2</sup> in 1908, the study of this cattle problem has progressed but slowly. The disease has been reported from the important cattle centers of Europe, South Africa, and India, and from at least 27 states in this country and promises to become one of the chief menaces to the cattle industry. However, its slowly progressive and non-spectacular features have curbed the interest in this country of all except a few workers, and consequently the technical journals show a dearth of literature on the subject.

Our study of the literature was greatly aided by the comprehensive bibliography arranged by Hastings, Beach and Mansfield.<sup>3</sup> Twort and Ingram,<sup>4-6</sup> Bang,<sup>7</sup> and M'Fadyean *et al*<sup>8-12</sup> are among the leading students of this disease in Europe. Contributions in this country have come largely from Meyer,<sup>13</sup> Hastings, Beach and Hadley,<sup>14-16</sup> Hagan and co-workers,<sup>17, 18</sup> Clark,<sup>19</sup> Marshall,<sup>20</sup> Turner,<sup>21</sup> Wright,<sup>22</sup> and the U. S. Bureau of Animal Industry. These American contributions have been directed largely toward diagnosing and controlling the disease, but there is yet much conflicting information regarding the relative value of johnin and avian tuberculin as diagnostic agents.

With the exception of Sir John M'Fadyean, other workers have given but little attention to the histological phase of the subject, although observations on the gross pathology have been recorded by almost every worker.

The lesions are reported to be limited to the intestines and contiguous lymph-nodes, except by F. P. Mathews,<sup>23</sup> who has described lesions in the liver. The affected lymph-nodes are described as edematous, exuding a milky fluid, watery, soft, swollen, congested, mottled, and as showing no changes. The

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condition of the intestine is so universally described as "folded or corrugated" as to be erroneously regarded by field men and practitioners as essential for a positive diagnosis. However, Hastings and Beach have reported the lack of correlation between gross evidence of hyperplasia and the number of organisms actually present and have emphasized their observation that severely affected animals may show very little hyperplastic change in gross. Associated with the hyperplastic lesions are reported "congestion of the folds with no ulceration." The lesions are reported as being most frequently found in the lower part of the small intestine, ileocecal valve, cecum, colon and rectum in the order named.

M'Fadyean<sup>9</sup> discusses the histology of the disease to a considerable extent and emphasizes the similarity of the development of the Johne's disease lesion to that of the tubercle up to the stage where necrosis begins.

None of the workers has associated the lesions or the Johne's bacillus within the macrophages with any degenerative changes. M'Fadyean attributes the symptom of disturbed digestion and absorption to the replacement of tissue elements by the new (hyperplastic) tissue and to the destruction of the tubular glands. The apparent lack of degenerative changes has made the explanation of the symptoms a baffling problem for pathologists. This rarity, together with the almost commensalistic relation of Johne's bacillus and the macrophage have provided a stimulating study. Much about this subject is left unexplained after 37 years of study.

#### METHOD OF STUDY

The observations reported in this paper are based on the study of material obtained from 19 animals out of a herd of approximately 150 cattle. In the spring of 1931, one cow was killed upon clinical evidence of Johne's disease although she had failed to react to johnin. Upon examination she was found to be affected with the disease. In the fall of 1931, two other cows, showing clinical evidence of the disease, were killed and found to be affected. In January, 1932, through the coöperation of Dr. O. H. Core, of the Michigan State Department of Agriculture, the entire herd, consisting of 147 head, exclusive of calves under six months of age, was tested with avian tuberculin kindly furnished by Dr. W. A. Hagan, of the New York State Veterinary College. Twenty-seven head gave a thermal reaction to the test. Up to the time of writing this paper, 16 of the reacting animals have been slaughtered and studied. All



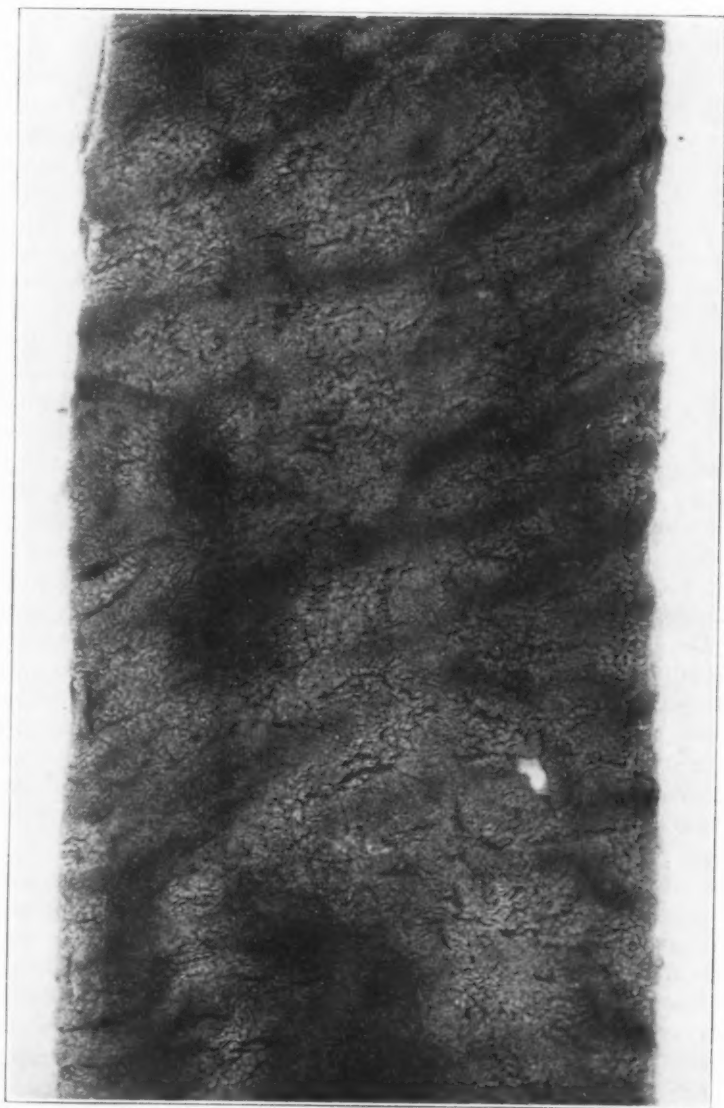


FIG. 1. Case 2444. Segment of small intestine showing earliest grossly recognizable hyperplastic areas.

of the reactors have shown lesions associated with acid-fast bacilli. Since the test was made, two mature animals tested but not reacting have been killed. Histological examination of these animals failed to demonstrate evidence of infection.

The technic used in examining these animals was as follows: With the exception of four cases, the gross examination of viscera was made at the slaughter-house, and material for histological examination obtained and placed in fixing solution immediately after slaughter. The viscera of four cases were transported to the laboratory with approximately three to four hours elapsing between slaughter and examination. Material was obtained from various levels of the intestinal tract and the contiguous lymph-nodes of all cows and from the lungs, liver, spleen, kidneys, adrenals and abomasum of some of the cases. Most of the material was fixed in Zenker's fluid, but 10 per cent formalin was used on some of the material. Smears for bacteriological examination also were made from some of the first cases slaughtered, but it was found more satisfactory to stain sections of tissues for acid-fast rods than to attempt to demonstrate them in smears. In our experience those animals showing slight tissue changes in the intestinal wall and mesenteric lymph-nodes contain but few acid-fast rods in the tissues, and it was with much difficulty that the organisms were found in smears from some of the cases. With proper technic the lesions in sections are recognized easily and may be singled out and examined for acid-fast rods. In some of the cases studied, the majority of lesions failed to show acid-fast rods, but by persistent search they were found in at least a few of the lesions of all cases studied.

For the demonstration of acid-fast rods in sections, paraffin-embedded tissue is to be preferred, but if quick results are desired, frozen sections may be used. For frozen sections, fixation of tissue in 10 per cent formalin, for 10 to 12 hours or longer, enables one to obtain better sections, but thin pieces of tissue may be satisfactorily sectioned after fixing three minutes in boiling 10 per cent formalin. Before the block of tissue is frozen, the fatty portions of the block should be dissected away, since the presence of much fat causes considerable trouble when sectioning. The tissue is frozen with  $\text{CO}_2$  gas by intermittent spurts, and the sections are cut 10 to 15 microns in thickness. The frozen sections are taken off the knife with the finger moistened with water, floated on water, and rolled on micro slides by means of a glass rod. They are dehydrated by carefully running a small amount of 95 per cent alcohol onto

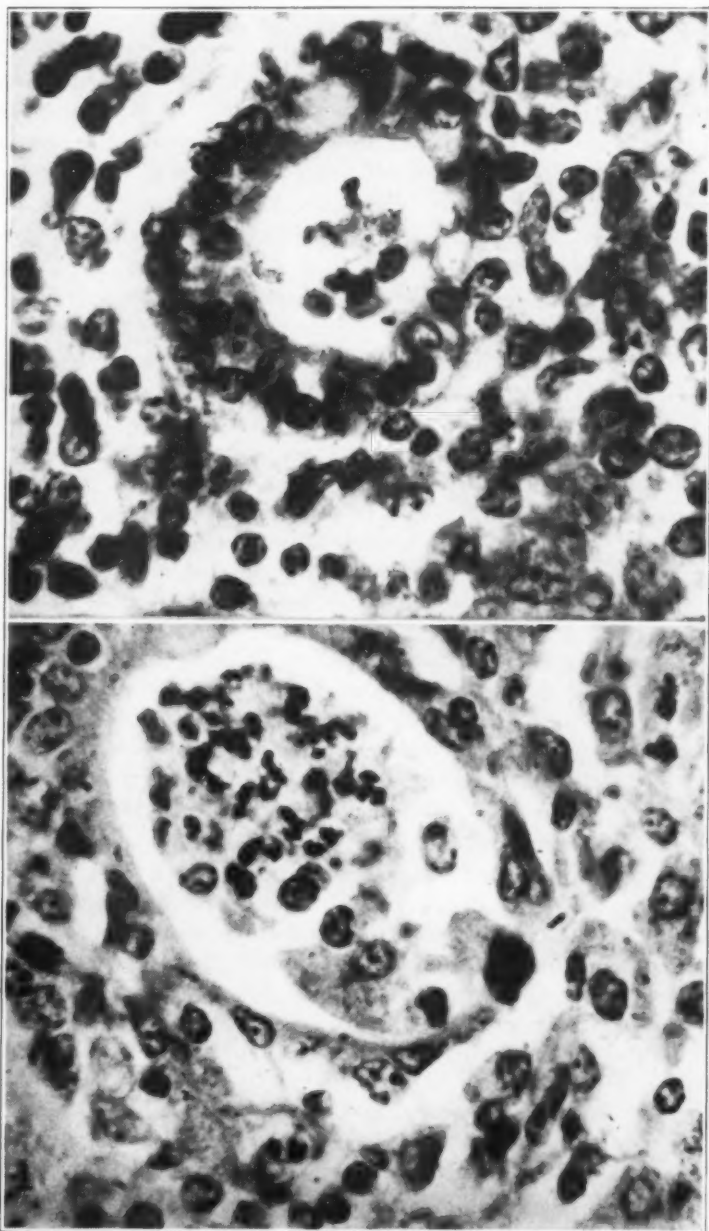


FIG. 2 (above). Case 2305, F 3. Macrophage containing rods, and three polymorphonuclears in an otherwise normal tubule of the intestinal mucosa. Carbol-fuchsin and hematoxylin (x 930).

FIG. 3 (below). Case 2305, F 3. Tubule of intestinal mucosa, with some desquamation of the epithelium, containing macrophage with rods and a number of polymorphonuclears. Carbol-fuchsin and hematoxylin (x 930).

the section by means of a medicine-dropper and then flattening the section by pressing gently with a piece of blotting-paper. Without allowing the section to dry, it immediately is covered with a very thin solution of celloidin, the excess allowed to drain away for a few seconds, and then hardened in 80 per cent alcohol for a few minutes. It then is stained in the same way as a paraffin section.

We have discovered that Johne's bacillus is much more easily stained in sections than was formerly believed. Hot stain is not necessary, nor is prolonged exposure to the cold stain essential. After the organism is stained, it is quite resistant to the action of decolorizing agents. In routine work the rods are beautifully brought out if stained three to five minutes in Ziehl-Neelson's carbol-fuchsin at room temperature, dipped in water, decolorized 10 seconds in a 10 per cent aqueous solution of  $\text{HNO}_3$ , dipped in water, and then decolorization completed in a 1 per cent  $\text{HNO}_3$  solution in 70 per cent alcohol for three minutes. Since the rods are still beautifully stained after 20 minutes of treatment with acid alcohol, preceded by treatment with 10 per cent  $\text{HNO}_3$  for ten seconds, in routine work we never time the treatment with acid alcohol, but the sections remain in it until they show only a trace of red by transmitted light. This degree of decolorization gives a beautiful background for counterstaining with hematoxylin. By proper counterstaining, the sections are entirely satisfactory for histological examination and for photographing.

The following technic for counterstaining will give good results: After being decolorized in 1 per cent acid alcohol, the sections are washed in tap water to remove the acid and stained four to five minutes in Harris' alumhematoxylin containing 4 per cent of glacial acetic acid. Then they are washed in water, decolorized in 1 per cent  $\text{HCl}$  in 70 per cent alcohol to the desired intensity of hematoxylin stain, neutralized in  $\frac{1}{2}$  per cent aqueous solution of ammonia, and washed in tap water. They are dehydrated in 95 per cent alcohol followed by absolute alcohol, cleared in carbol-xytol followed by neutral xytol, and mounted in neutral xytol balsam.

Reference is made above to the ease with which Johne's bacilli are stained in sections and their tolerance for decolorizing agents. The data shown in table I were obtained by Mrs. Ruth Odell, working in our laboratory with Zenker's fixed paraffin sections cut six microns thick.

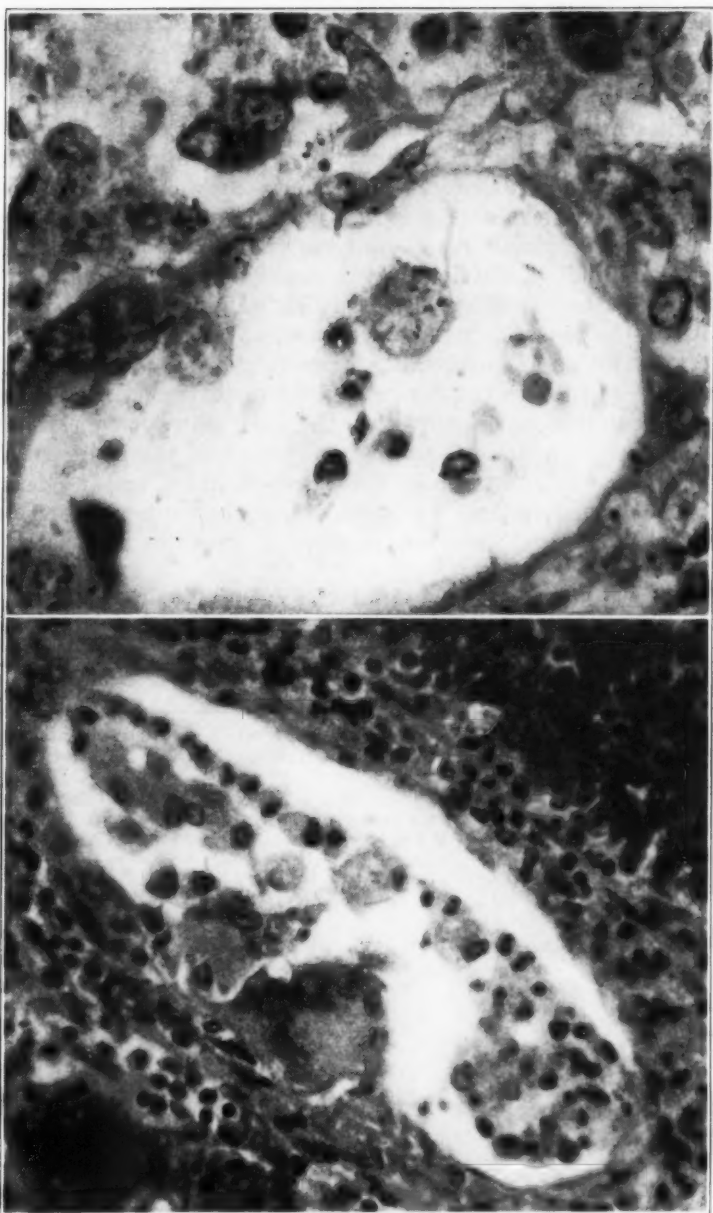


FIG. 4 (above). Case 2305, F 1. Tubule of intestinal mucosa showing desquamation of the epithelium, and one macrophage containing rods. Note the rods in macrophages within the stroma. Carbol-fuchsin and hematoxylin (x 930).

FIG. 5 (below). Case 2407, 3. Tubule of intestinal mucosa showing some desquamation of epithelium, macrophages, and polymorphonuclears in the lumen, and two giant-cells in the wall of the tubule. Eosin and hematoxylin (x 450).

## GROSS LESIONS

In the cases studied, the gross lesions have been limited to the intestinal tract and contiguous lymph-nodes. The intestinal mucosa has not shown the extensive thickening and folding usually illustrated as characteristic of Johne's disease. In fact, not one of the cases studied has shown grossly a widespread extensive hyperplastic reaction of the mucosa although case 2518 showed a limited distribution of moderate corrugation in the small intestine. In those cases showing well marked hyperplastic reaction the areas of hyperplasia were, as a rule, small focal or short linear areas involving a relatively small portion of the mucosa. It appears that there is some disturbance in the capillary circulation associated with the early development of the lesion because a limited, patchy congestion of the capillaries is usually present. At times there are distinct and numerous petechial hemorrhages. In one of our cases (autopsy 2380) no hyperplastic areas were recognizable in gross at any point in

TABLE I—Results of acid-fast staining of Johne's bacilli in sections of lymph-node and intestine with carbol-fuchsin at room temperature.

TIME	MAXIMUM DECOLORIZATION TIME STAINING TIME CONSTANT ( $\frac{3}{4}$ HOUR)			MINIMUM STAINING TIME
	EXPOSURE TO 10% HNO <sub>3</sub> ACID ALCOHOL* CONSTANT (3 MINUTES)	EXPOSURE TO ACID ALCOHOL		DECOLORIZATION CONSTANT 10% HNO <sub>3</sub> 10 SECONDS ACID ALCOHOL 3 MINUTES
		10% HNO <sub>3</sub> CONSTANT (10 SECONDS)	10% HNO <sub>3</sub> CONSTANT (1 MINUTE)	
15 secs.	Good	Good	Good	Negative
30 secs.	Good	Good	Good	Lymph-node fair
1 min.	Good	Good	Good	Intestine vague
2 mins.	Good†	Good	Good	Fair
3 mins.	Good	Good	Good	Fairly good
4 mins.	Good†	Good	Good	Good
5 mins.	—	Good	Good	Good
10 mins.	Lymph-node vague†	Good	Good	Good
15 mins.	Intestine fair	Good	Good	Good
20 mins.	—	Good	Good	Good
30 mins.	—	Good	Fair	Good
	Intestine very vague	Fair†	Fair	Good
	Lymph-node negative			
60 mins.	Negative	Vague	Fair†	Good
2 hrs.	Negative	Vague	Vague	Good

\*1% HNO<sub>3</sub> in 70% alcohol.

†Rods slightly purple.



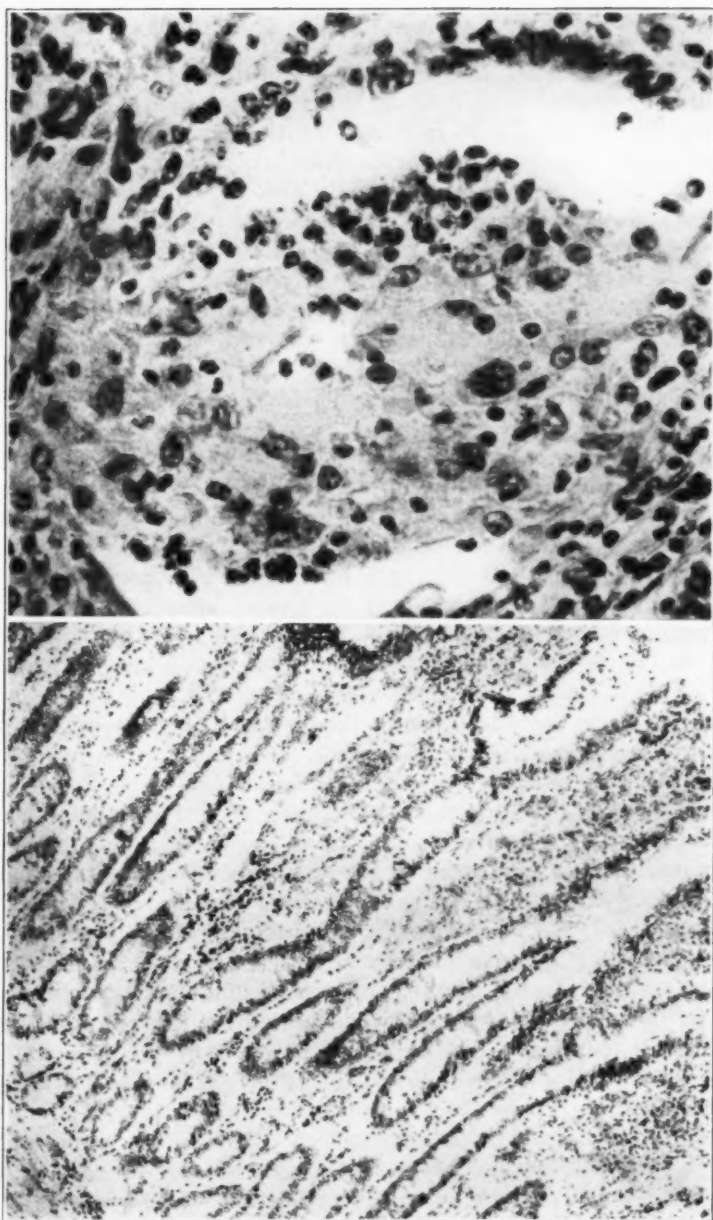


FIG. 6 (above). Case 2305, E 6. Lumen of tubule of intestinal mucosa containing cell mass consisting of macrophages and polymorphonuclears continuous with the stroma at two points, resulting in partial obliteration of the tubule. Eosin and hematoxylin (x 450).

FIG. 7 (below). Case 2403, 8. Showing location of primary lesion in stroma of intestinal mucosa at A and illustrated in figures 8 and 9. Carbol-fuchsin and hematoxylin (x 100).

the intestinal canal, and the gross alterations in the intestinal wall were limited to a scattered patchy congestion of the mucosa from the 37- to the 90-foot level of the small intestine and a few small congested and petechiated areas in the cecum and colon. In another case (autopsy 2404) the gross intestinal lesions also were limited to a scattered, patchy congestion with an occasional petechia, with the exception of a slightly swollen area of the intestinal mucosa, 3x10 mm, three feet from the cecum and two slightly swollen areas in the mucosa of the cecum, 4x8 mm and 20 mm in diameter, respectively. Histological examination of some of these areas of both cases showing only congestion of the capillaries and petechiae revealed lesions of Johne's disease.

The earliest recognizable hyperplastic lesions consist of small oval or linear, slightly raised, glistening areas a few millimeters in length and breadth and pinkish gray to reddish in color, occurring at any of the levels of the small intestine and in the cecum, colon and rectum. At times the lesions are of a steel-gray color. The variations in color appear to depend upon the amount of capillary blood in the lesion. The lesions often are isolated, or may be in groups or confluent in segments of varying lengths of the intestines. Frequently they are accompanied by capillary congestion or petechiae. It is the extension and coalescence of such lesions that leads to the corrugation and thickening of the mucosa that are considered the characteristic lesions of the disease. Since it appears that the early clinical and non-clinical reactors rarely show the corrugation and thickening of the intestinal mucosa and since in our experience Johne's bacilli are not always abundant in the intestinal mucosa or contiguous lymph-nodes, the recognition of the early focal lesions is necessary in order that bacteriological and histological examinations may be concentrated on them in routine diagnostic examination.

In table II we have tabulated the location of grossly recognizable hyperplastic foci found in the cases of this series. We have not attempted to indicate the spread of the lesions in the intestinal mucosa but have recorded the level at which the first lesion in the small intestine was seen. In four cases (autopsies 2306, 2372, 2380 and 2444) histological examination of areas, which showed only injection of capillaries at higher levels than those at which the first foci of hyperplasia were seen, revealed lesions of Johne's disease. Unfortunately, histological examination of higher levels of all the cases was not recorded.

The mesenteric and mesocolic lymph-nodes contiguous to the segments of the intestine showing lesions usually show swelling,



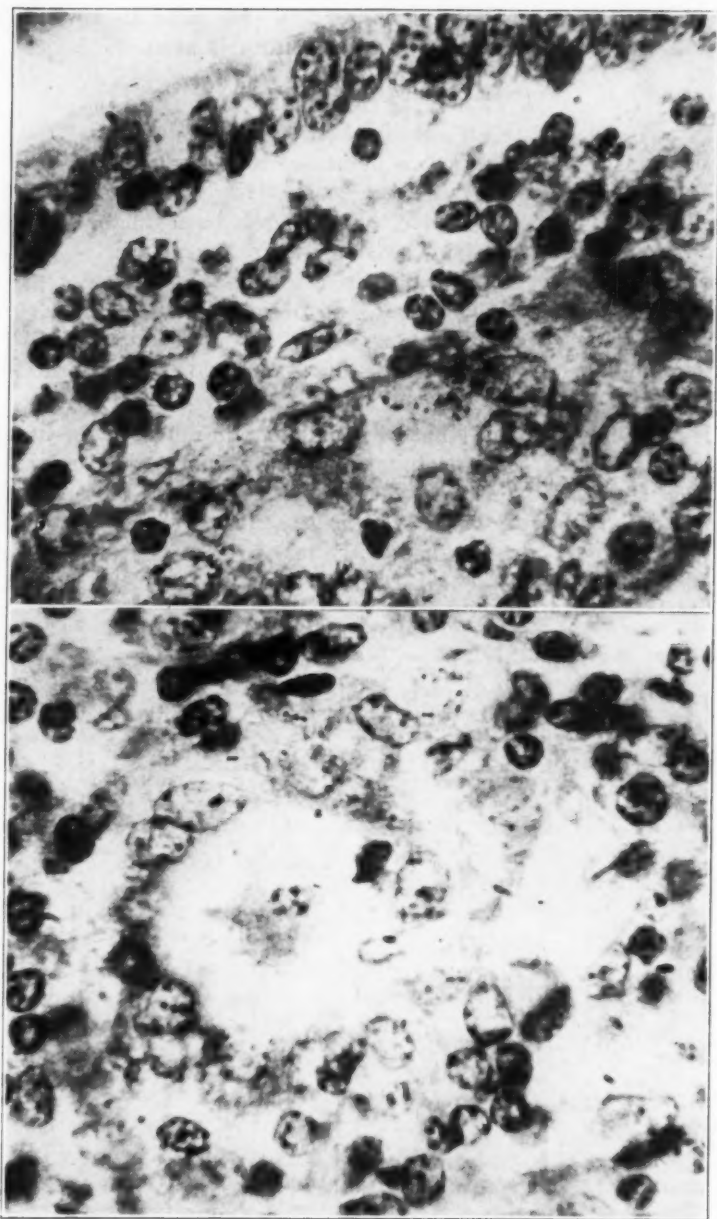


FIG. 8 (above). Higher magnification of point A shown in figure 7, showing macrophages containing rods (x 930).  
FIG. 9 (below). Approximately same location as shown in figure 7, showing giant-cells and macrophages containing rods (x 930).

edema, and occasionally congestion and petechiae to a variable degree. Mottling of the cortex sometimes is seen.

#### HISTOLOGICAL LESIONS

In the cases studied, specific histological lesions are limited to the intestinal mucosa, submucosa, and contiguous lymph-nodes. A few suggestive focal lesions have been seen in the liver and hepatic lymph-node, but we have been unable to associate them with acid-fast rods. We are uncertain as to the location of the primary lesion in the intestine. In this paper various lesions are illustrated and we are suggesting certain hypotheses based on our observations, with the hope that they will stimulate others to the study of the pathology of this disease.

It appears probable that the primary lesion may be intratubular, that is, originating within the lumen of the gland tubule (figs. 2 to 6, inclusive). Figures 2 to 4 illustrate the intratubular phagocytosis of Johne's bacilli. (The word "phagocytosis" is used here because of the lack of a better term. There

TABLE II—Location of grossly recognizable hyperplastic areas in intestinal mucosa of cows reacting to avian tuberculin.

CASE	AGE (YRS.)	LEVEL IN SMALL INTESTINE OF FIRST LESION	CECUM	COLON	RECTUM	CLINICAL EVIDENCE OF DISEASE
2280*	3	6 feet from cecum	+	+	—	+
2305	—	10†	—	—	—	+
2306	—	137†	—	—	+	+
2372	3	40	+	+	+	—
2373	3	96	+	—	—	—
2374	5½	75	—	—	—	—
2380	6	None	—	—	—	—
2381	1½	None	—	—	—	—
2403	5½	35	—	—	—	—
2404	1½	3 feet from cecum	—	—	—	—
2405	5½	30	+	+	—	—
2407	11	60	+	+	+	?
2444‡	7	37	+	+	+	+
2445	4½	60	+	+	+	+
2473	2½	4 feet from cecum	+	+	—	—
2474	5	84	—	+	—	—
2518‡	4½	50	—	—	—	—
2519	3	60	—	—	—	—
2520	2½	40	—	—	—	—

\*First 3 cases not tested.

†Unless otherwise stated, number indicates distance from abomasum.

‡See text for discussion.

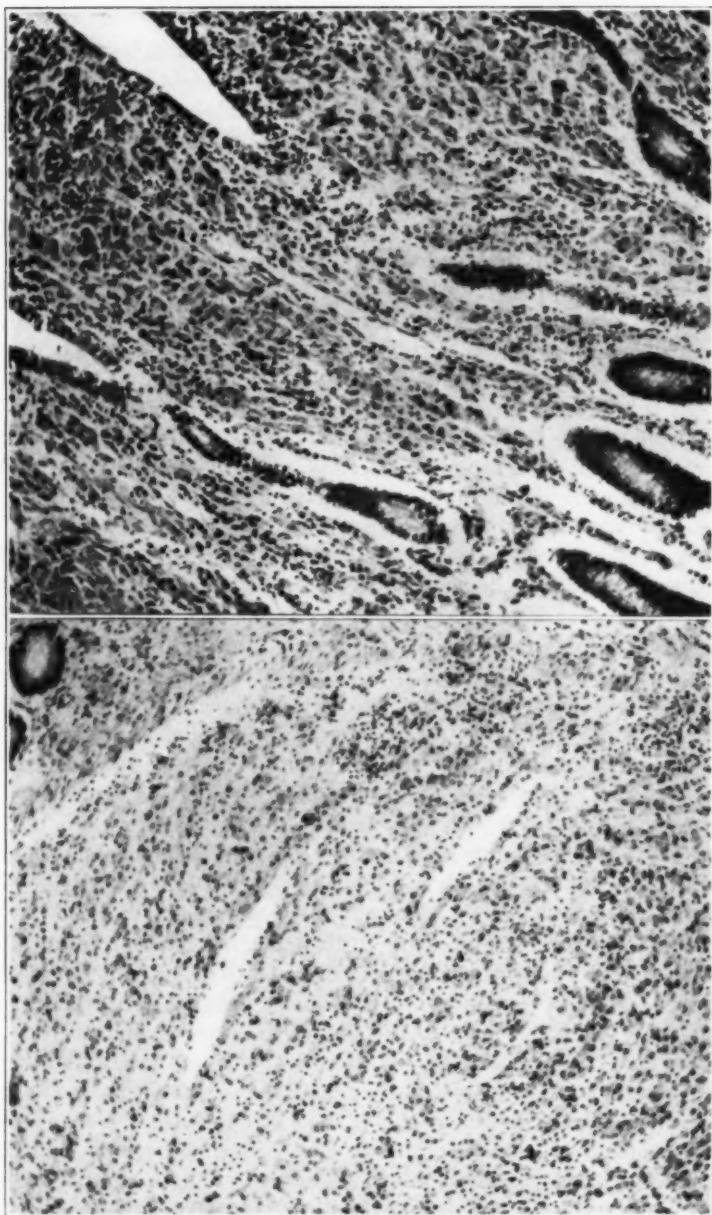


FIG. 10 (above). Case 2444, 8. Extensive hyperplasia of the stroma of the intestinal mucosa. Eosin and hematoxylin (x 100).

FIG. 11 (below). Case 2444, 2. Macrophages and giant-cells in lymphatic vessel of the submucosa of the intestine resulting in partial obliteration of the vessel. Carbol-fuchsin and hematoxylin (x 100).

is no distinct evidence of destruction of rods after they are engulfed by the phagocytes.) In sections Johnne's bacillus always is found intracellular, except as it has been observed in necrotic tissue. It appears to be engulfed by only one type of cell, the macrophage (and its progeny—the giant-cell). (The word "macrophage" is used here in the sense as used by Maximow, Gay and Lewis.) We never have found the organism in polymorphonuclears, lymphocytes, plasma cells, or epithelial cells. It has not been found free among living macrophages. Since the organism occasionally, though not frequently, is seen engulfed by macrophages within a tubule, the epithelium of which is intact, the thought is suggested that Johnne's bacilli in the lumen of the tubule may attract macrophages, which apparently possess the property of passing through the intact epithelium, or may be engulfed by macrophages already present within the tubule.

Macrophages containing acid-fast rods are at times associated with polymorphonuclears within the tubule, as if polymorphonuclears also are attracted by rods within the tubule, although we never have found organisms within the polymorphonuclears (fig. 3). It appears probable that since the macrophage may pass from the stroma through the intact epithelium into the lumen of the tubule, it is equally capable of passing from the lumen of the tubule back into the stroma, carrying with it any acid-fast rods it may have engulfed. The question naturally arises as to the correct interpretation of the presence of the macrophage containing acid-fast rods within the lumen of the tubule. Does it indicate intratubular ingestion of rods or exudation into the tubule of a macrophage containing rods? We believe the former, because it is not a common occurrence. It is seen no more frequently in the most extensive cases of intestinal hyperplasia with innumerable macrophages containing masses of rods than it is seen in the mildest form of lesions. If it indicates exudation, its extent should be in direct ratio to the extent of hyperplasia.

The chain of events, as we have interpreted them, following the ingestion of rods by macrophages, constitutes the most interesting chapter in the pathology of this disease. We conceive of the primary lesion as having its origin with a macrophage which has ingested the microorganism. This primary lesion may arise within the tubule or within the stroma, as the result of migration of the macrophage from the tubule to the stroma, or possibly the rod may reach the stroma through breaks in the continuity of the surface epithelium and immediately be engulfed by a macrophage.

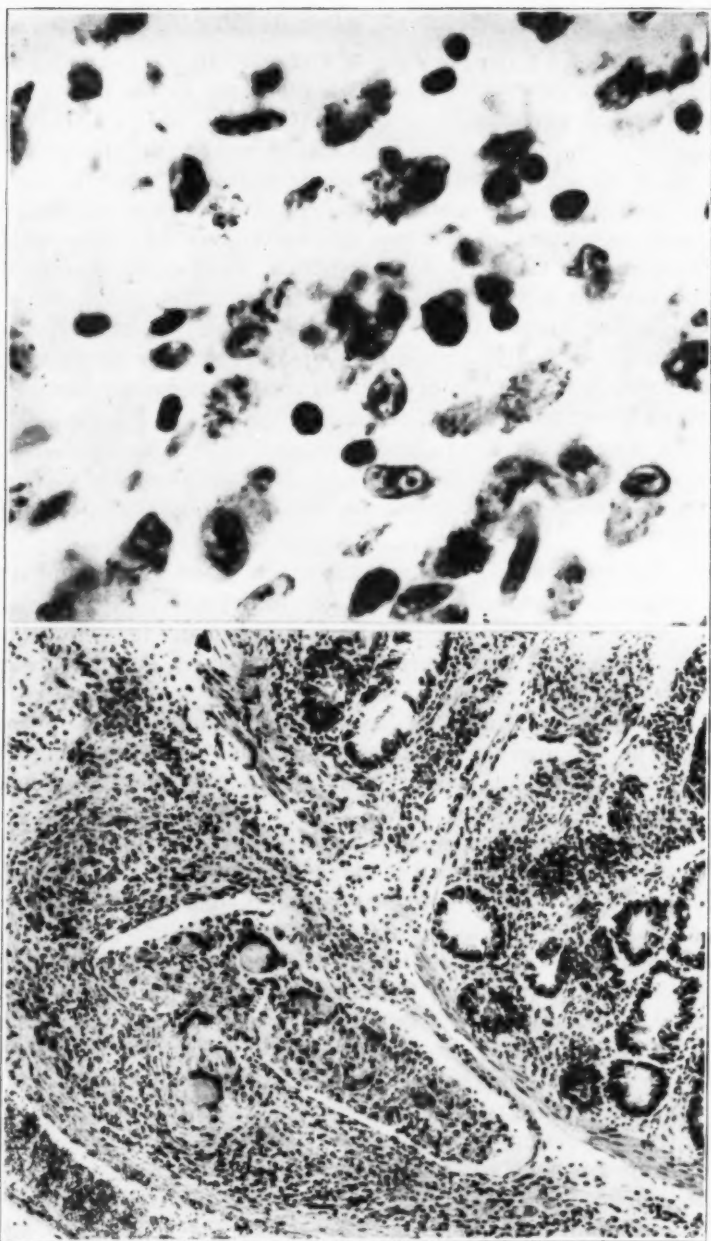


FIG. 12 (above). Higher magnification of macrophages and giant-cells containing rods in lymphatic vessel shown in figure 10 ( $\times 930$ ).  
 FIG. 13 (below). Case 2444, 3. Extensive hyperplasia of the submucosa of the intestine. Carbol-fuchsin and hematoxylin ( $\times 100$ ).

Just what effect the presence of rods within the cell has upon the cell, the organ, or the host as a whole we do not know. We have seen no evidence that rods within the cell produce any recognizable degeneration or necrosis of either the cell containing the rods or of contiguous, identical, or different types of cells. Following the ingestion of rods, two primary phenomena are seen to occur: an increase in the number of macrophages in the area, and the early development of giant-cells. The smallest microscopic lesion may consist of one or a few macrophages, one or a few giant-cells, or a combination of the two types of cells (figs. 8 and 9). In the earliest stages of the process, the lesions within the stroma are usually more abundant in the outer third of the mucosa than toward the muscularis mucosa.

Since Johne's bacilli are practically never seen extracellularly, even in those areas where the majority of macrophages contains a few to masses of acid-fast rods, a number of possibilities are suggested:

1. The rods are either carried into the tissue by macrophages or are engulfed immediately upon their entrance.

2. Once the rod is engulfed by a macrophage, it is not given up, or if released it is immediately engulfed by another macrophage.

3. The enormous number of rods found in many of the macrophages as the disease progresses indicates that probably the rods are able to reproduce within the cell without destroying the cell.

4. The fact that in many of the early lesions, in the first stages of the disease, such a small proportion of macrophages and giant-cells contain acid-fast rods (in one count there was an average of one acid-fast rod to fifteen primary lesions, case 2381) suggests two possibilities: Either the presence of a few rods in the macrophages stimulates an extensive increase in the number of macrophages in this area, or else in these early stages of the process the macrophages destroy engulfed bacteria, a property which, if possessed at this time, is apparently lost as the disease progresses.

With our present knowledge we cannot explain all the details of the process involved in the extension of the lesion from the microscopic foci consisting of one or a few macrophages or one or a few giant-cells, showing none or but a few acid-fast rods, to extensive areas of hyperplasia of macrophages and giant-cells containing enormous masses of rods. We suspect, however, that the extensive increase in the number of macrophages results



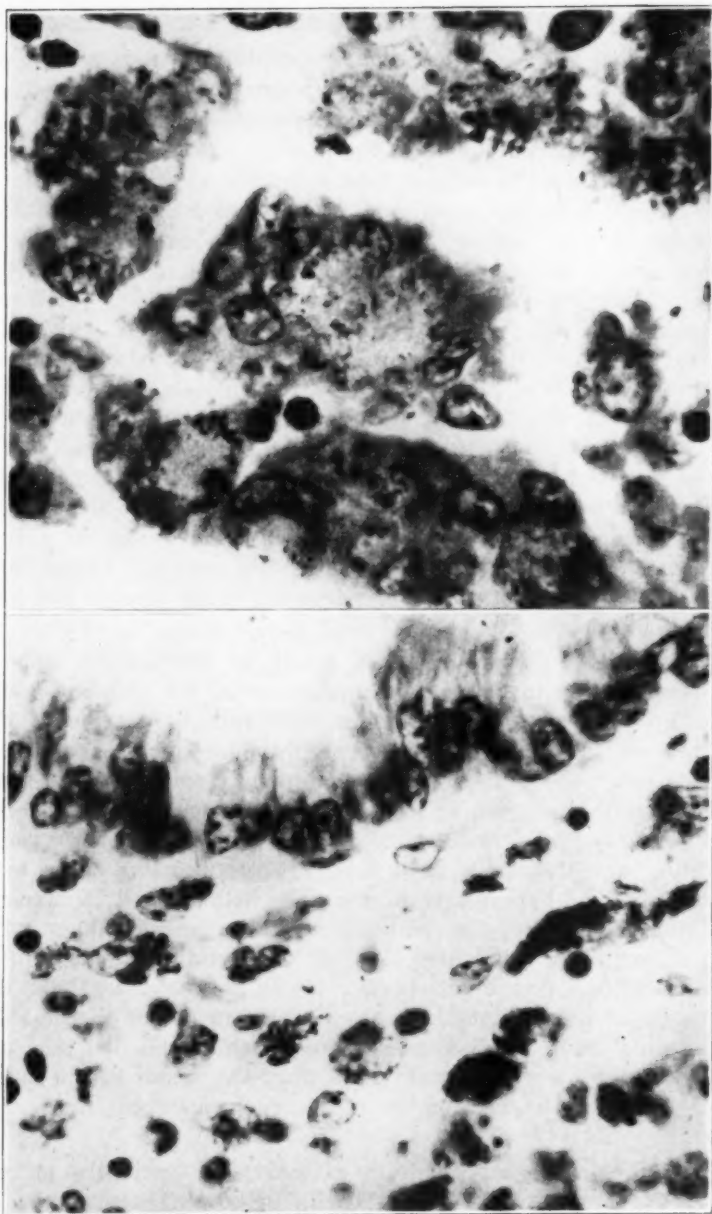


FIG. 14 (above). Higher magnification of lesion shown in figure 13, showing enormous number of rods in the macrophages (x 930).

FIG. 15 (below). Case 2444, 3. Macrophages containing masses of acid-fast rods in close proximity to the epithelium of a gland tubule. Note the absence of evidence of injury to the epithelial cells. Carbol-fuchsin and hematoxylin (x 930).

in part from mitosis of macrophages containing rods as well as the transformation of lymphocytes, plasma cells, and monocytes into macrophages. One of the earliest phenomena seen is the development of giant-cells. Frequently one giant-cell in an otherwise normal microscopic field is the first evidence of disease. The extension of the process is characterized by a progressive increase in the number of the macrophages and giant-cells in the stroma. This leads to thickening of the stroma and an increasing proportion of macrophages and giant-cells to small undifferentiated cells, until that stage is reached in which the stroma consists largely of macrophages with a variable number of giant-cells (fig. 10). Early in the process the lymphatic capillaries show an increasing number of macrophages, a variable number of which contain acid-fast rods. It is apparently through the lymphatics that the process is extended to the submucosa and to the mesenteric lymph-nodes. As already indicated, in the early stages of the process the lesions as a rule are concentrated in the outer third of the mucosa. Later there is a gradual extension to the deeper areas of the mucosa and into the submucosa.

The lesions of the submucosa, which at first usually appear as focal lesions involving, or contiguous to, the lymphatic vessels, gradually progress to extensive, diffuse infiltration of the submucosa, identical with those seen in the stroma of the mucosa. Occasionally the earliest evidence of involvement of the submucosa is the presence of a few or many macrophages, with or without giant-cells, within the lymph-vessels, which by proper staining are seen to contain acid-fast rods. Later there may be evidence of hyperplasia of the cells within the lymph-vessel with an extension of the cell mass, which becomes confluent with the surrounding structures, leading to partial or complete occlusion of the lymph-vessel (fig. 11). This is essentially the same process as is sometimes seen in the tubules of the mucosa, illustrated in figures 5 and 6. Through this extension the submucosa may show a diffuse thickening, the result of the presence of an enormous number of macrophages containing rods (figs. 13 and 14).

The absence of any apparent extensive injury to the macrophages and giant-cells by the bacilli or to the parenchyma of the mucosa by the products of the organisms is to us one of the most surprising phenomena. Macrophages are seen to contain bacilli so numerous that they are no longer recognizable as individual rods, but appear as masses of acid-fast stained ma-



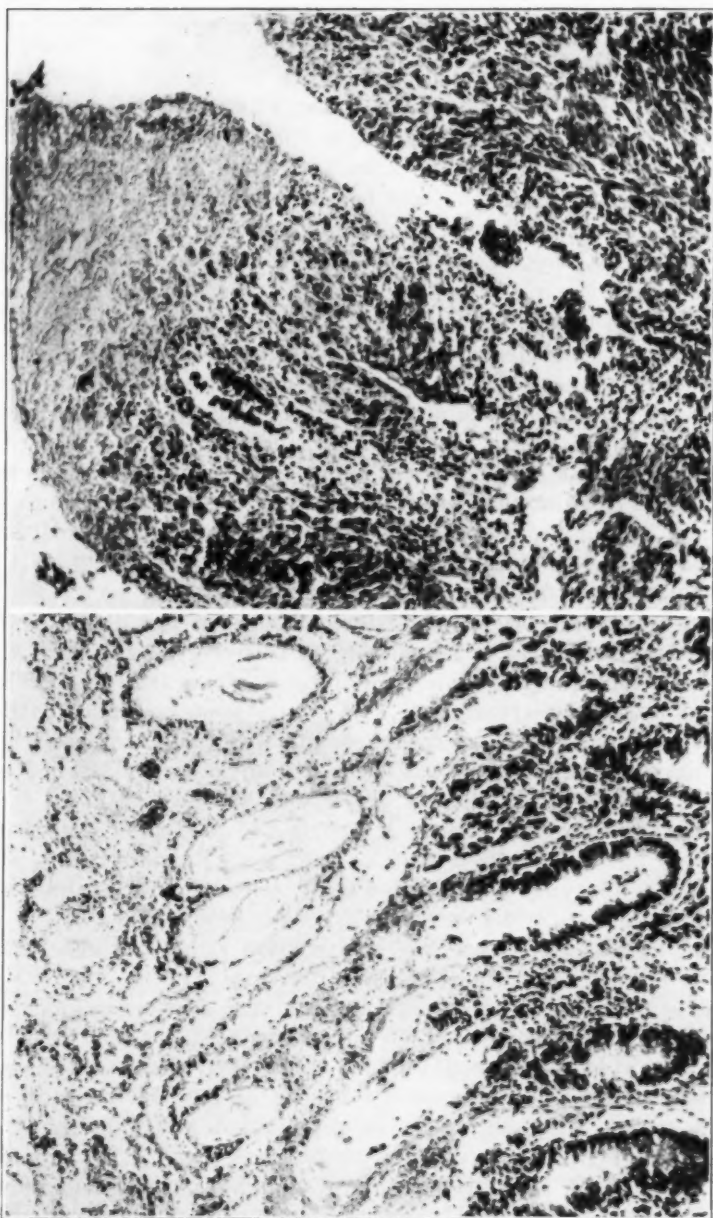


FIG. 16 (above). Case 2444, 6. Extensive hyperplasia of the stroma of the intestinal mucosa with necrosis of the superficial portions of the villi. Eosin and hematoxylin (x 100).

FIG. 17 (below). Case 2444, 3. Hyperplasia of the stroma and necrosis of the superficial portion of the intestinal mucosa. The dark-stained material in the necrotic tissue and much of the deeper living structures consists largely of masses of acid-fast rods. Carbol-fuchsin and hematoxylin (x 100).

terial, yet show no evidence of injury to the cell. It is true that occasionally a gland tubule is seen which contains a variable number of macrophages and polymorphonuclears with evidence of injury to the epithelium. Also, as a result of hyperplasia, the cell mass within the tubule may become confluent with the stroma, leading to obliteration of the tubule. However, this lesion is an exceptional one, and our observations incline us to look upon it as primary within the tubule and not the result of extension of a process having its origin within the stroma.

There is no evidence of appreciable injury to the epithelium of glands by the products of bacteria, nor any evidence of appreciable diminution in the actual number of gland tubules. Even in those areas where there is extensive hyperplasia of macrophages, containing enormous numbers of acid-fast rods, the immediately adjacent gland tubules usually show no evidence of injury (fig. 15). Apparently the pronounced clinical disturbances must be attributed to causes other than toxicity of the organism or to interferences with absorption.

The frequently repeated statement seen in the literature to the effect that there is no correlation between the extent of the gross lesions and the clinical condition of the animal is corroborated by our observations. This would seem to indicate that lowered capacity of absorption due to hyperplasia of the walls of the mucosa, as has been suggested by others, does not account for the emaciation or the severe diarrhea. It is a fact, as already shown, that there is blocking of the lymphatics of the mucosa and of the submucosa as the result of extensive hyperplasia of macrophages and giant-cells, but obviously the number of lymphatics blocked in this way is so small in proportion to those not affected that they should have no appreciable effect upon absorption. The condition illustrated in figures 16, 17 and 18 may explain the severe diarrhea and emaciation clinically accompanying the disease. We have found it in only three of the cows studied (cases 2444, 2445 and 2518). Case 2444 showed the most extensive microscopic lesions of any of the cases of this series, although extensive corrugation and thickening of the mucosa was absent. This was a seven-year-old cow, in fair condition as to flesh at the time of slaughter, which had shown no diarrhea until the day before slaughter. When tested with avian tuberculin in January, she gave a thermal reaction which reached a maximum of 106.2. The following is a summary of the autopsy protocol of this case:

The first disturbance noticed is a Peyer's patch about 20 inches

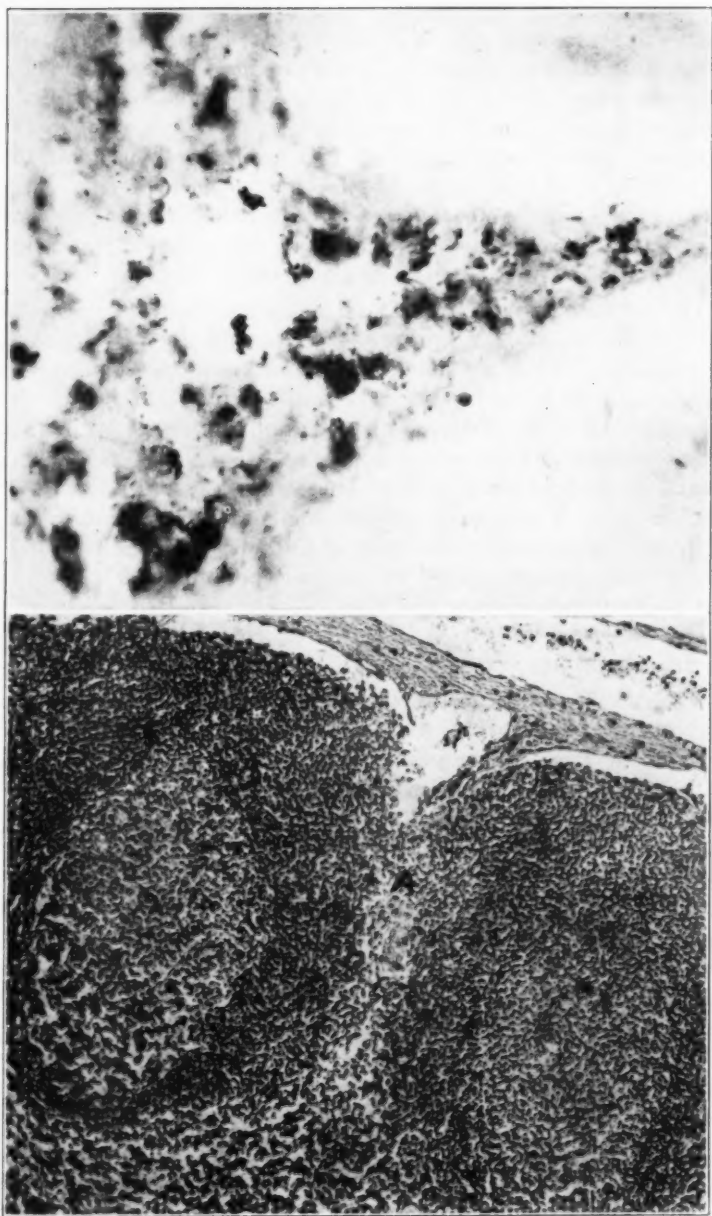


FIG. 18 (above). Point A in figure 17, showing masses of acid-fast rods in necrotic tissue (x 930).

FIG. 19 (below). Case 2407, 8. Early lesion in lymph-node consisting of a few macrophages at A. Carbol-fuchsin and hematoxylin (x 100).

from the abomasum, which is slightly swollen and shows numerous petechial hemorrhages. There are no further changes until at the 24-foot level, where the folds of the mucosa show patchy congestion and numerous petechial hemorrhages. This condition continues through to the 37-foot level, at which point there begins the first evidence of distinct hyperplasia. This patchy, congested, hemorrhagic, hyperplastic condition continues in varying degree and extent to the 100-foot level, making a total of approximately 76 feet of the small intestine involved.

The cecum shows more or less moderate, uniform congestion, with a relatively small number of folds showing distinct patchy hyperplasia. This condition continues into the colon for approximately 10 to 18 inches. There are no further changes from there to the lower foot of the rectum, where about eight of the longitudinal folds show a patchy edema and slight hyperplasia of pinkish-gray color. Histological examination of the 42-, 52- and 72-foot levels of the small intestine shows a rather well marked superficial necrosis of the mucosa (figs. 16 and 17). There is limited superficial necrosis at the 20- and 50-foot levels, but sections taken from the 27-, 100- and 118-foot levels of the small intestine and from the cecum, colon, and rectum show no superficial necrosis.

The second case showing superficial necrosis of the intestinal mucosa (autopsy 2445) was a 4½-year-old cow in fair condition at the time of slaughter. She reacted to avian tuberculin with a temperature rise to 106° F. She had a history of a more or less continuous diarrhea for several weeks preceding slaughter. The first evidence of intestinal disturbance is observed two feet from the abomasum and is described as a patchy congestion. This condition continues to about the 25-foot level. Again, at the 45-foot level, there begins a congestion of the folds which rapidly becomes more marked until the folds show the typical pinkish-gray, slightly raised areas of hyperplasia. This hyperplastic condition subsides somewhat at the 80-foot level, but the congestion continues. From the 115-foot level the hyperplasia becomes progressively more severe to within two feet of the cecum. The mucosa of the cecum shows a somewhat mottled condition due to congestion of the folds and a few slightly raised steel-gray areas.

The upper six feet of the colon shows congestion and marked hyperplasia of the folds. From this point on the intestinal tract is negative. The contiguous lymph-nodes show little change in gross. Microscopic examination of sections from the 47-,

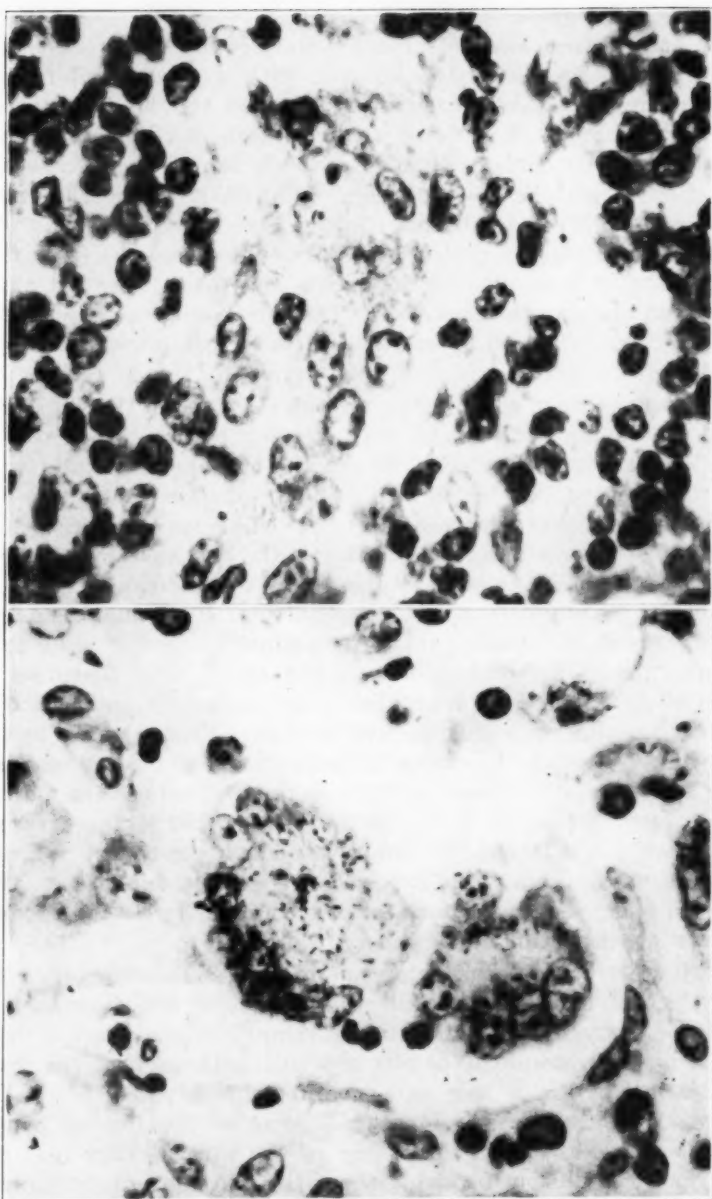


FIG. 20 (above). Higher magnification of point A in figure 19, showing macrophages, three of which are seen to contain one or two rods (x 930).

FIG. 21 (below). Case 2444, 2. Giant-cells containing acid-fast rods in subcapsular lymph-space of lymph-node. Carbol-fuchsin and hematoxylin (x 930).

62- and 68-foot levels of the small intestine shows extensive superficial necrosis of the mucosa, with a pronounced macrophage and giant-cell reaction adjacent to the necrotic tissue. A small number of acid-fast rods are seen in the macrophages and giant-cells, and a few rods are seen in the necrotic tissue. Sections from the 95-, 115- and 132-foot levels of the small intestine and from the cecum, colon and rectum show no necrosis, although all show a typical macrophage reaction, the lesions at the 132-foot level, and in the cecum and colon being extensive and containing numerous rods. The lymph-nodes contiguous to the cecum, colon and lower parts of the small intestine are extensively involved.

The third case showing superficial necrosis of the intestinal mucosa (autopsy 2518) was a 4½-year-old cow in good condition at the time of slaughter. She reacted to avian tuberculin with a temperature rise to 107.6° F. As far as known she did not have a history of diarrhea, although her feces were in a fluid state at the time of autopsy. This is the only case showing hyperplasia of the mucosa to the extent of producing the corrugation usually illustrated as the characteristic lesion. The first evidence of disturbance in the intestinal mucosa is seen as a congestion of the folds at the 30-foot level. This continues to the 50-foot level, and from this point to the 80-foot level corrugation with congestion is well marked. From the 80- to the 90-foot level there is extensive corrugation of the mucosa, but an absence of congestion, giving rise to a paleness of the mucosa not seen above this level. Sections from four different areas between the 80- and 90-foot levels show superficial necrosis of the mucosa, with acid-fast rods in the necrotic tissue. Necrosis is not seen in sections taken from other levels of the small intestine, the cecum or the colon.

Figures 10 to 18 illustrate some of the lesions seen in the intestines of case 2444. While this case does not show the extensive corrugations and diffuse thickening of the mucosa, there is a rather widespread, patchy hyperplasia throughout the small intestines, with a less extensive, patchy hyperplasia of the mucosa of the cecum and colon. Some of the foci of hyperplasia show extensive thickening of the stroma (fig. 10), not only of the villi but involving the entire thickness of the mucosa and extending as a diffuse infiltration and thickening of the submucosa (fig. 13). Figure 16 illustrates superficial necrosis of a villus of one of the hyperplastic areas, and figure 17 illustrates superficial necrosis extending more deeply into the mucosa.



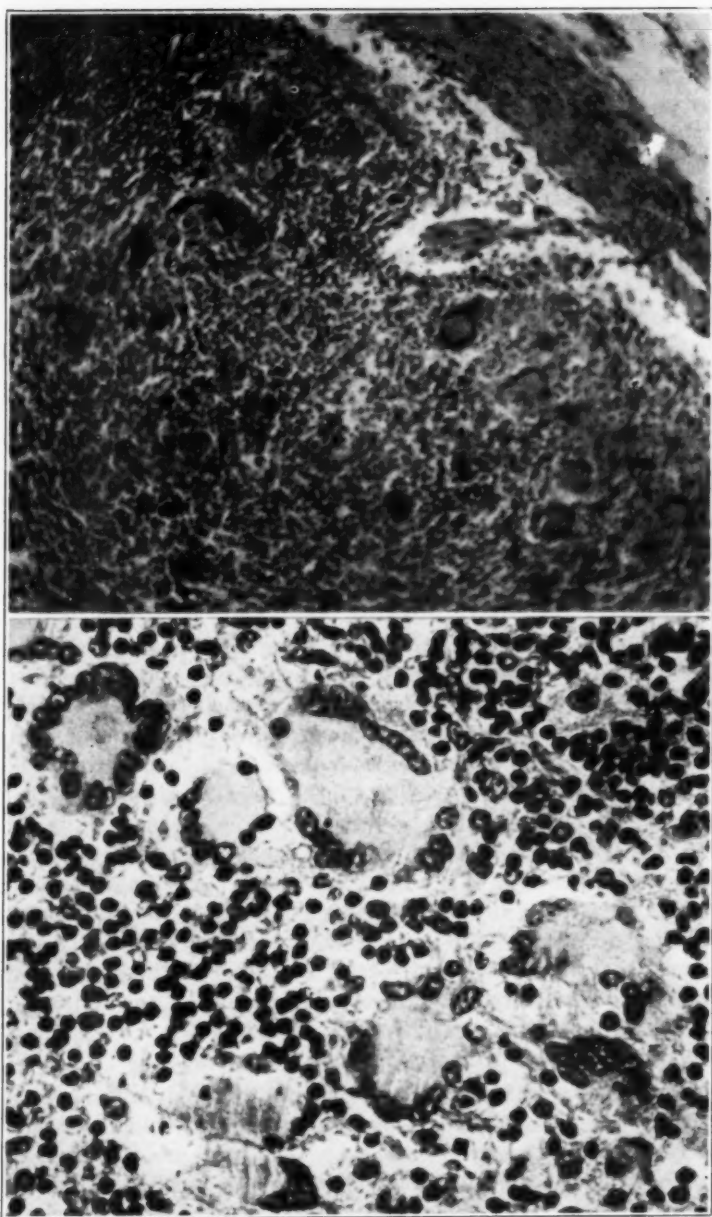


FIG. 22 (above). Case 2306, C 3. Well-marked lesion in lymph-node showing giant-cells and macrophages. Eosin and hematoxylin (x 100).

FIG. 23 (below). Case 2407, 4. Higher magnification of similar lesion shown in figure 22, showing giant-cells. Hematoxylin and eosin (x 450).



While our data are too limited to draw any conclusions as to the nature of this superficial necrosis, we do feel warranted in discussing it and suggesting certain etiological possibilities and its possible relation to the severe diarrhea and emaciation clinically associated with the disease.

As previously noted, we have failed to find any evidence that Johne's bacillus produces any products that apparently produce degenerative or necrotic changes in the macrophages and other cells of the stroma or of the more highly specialized epithelium of the glands that lie in proximity to macrophages containing masses of acid-fast rods (fig. 15). We have seen no evidences of degenerative or necrotic changes in the deeper portions of the intestinal wall nor in the mesenteric lymph-nodes, although many of the lymph-nodes of this group of animals show extensive lesions. It has appeared to us that the extensive hyperplasia of the mucosa, with the resultant blocking of the lymphatic and blood capillaries, may be a primary factor in the development of a superficial necrosis of the mucosa. If such a necrosis is a feature of the pathology of this disease, it constitutes a satisfactory explanation of the severe diarrhea and extreme emaciation.

A superficial necrosis of the mucosa obviously would not necessarily have to be extensive in order to produce severe clinical disturbances. Unquestionably a few small foci might give rise to serious clinical disturbances. In this case the necrotic portions of the mucosa show masses of acid-fast rods (fig. 18), a condition that, with erosion of the necrotic tissue, would produce mass contamination of feces with these rods. If this condition is a feature of the disease, it appears possible that ulceration might follow. We have not observed such ulceration, and to our knowledge it has not been reported in the literature on the disease. Is it possible that the enormous number of macrophages mobilized in the diseased portions of the mucosa serve as an effective barrier against the invasion of the living tissue by other pathogens that produce ulceration? We cannot suggest an answer at this time.

Involvement of the mesenteric lymph-nodes is a constant feature of the disease. Macrophages containing acid-fast rods are carried along the lymphatics to the contiguous nodes. The earliest recognizable histological lesions in the lymph-nodes consist of a few macrophages or a giant-cell or two in the sub-capsular and other lymph-sinuses or in proximity to the lymph-channels of the node (figs. 19 to 21). The follicles are apparently rarely, if ever, primarily involved, but as a result of ex-

tension of the primary lesion more or less diffuse involvement of the node may occur. As the process extends, there is an increasing proportion of macrophages and giant-cells over the small lymphoid type cell until the normal cell type is largely replaced by macrophages and giant-cells in widespread areas. As in the intestines, in the early stages of the disease comparatively few of the primary foci may show acid-fast rods. As the lesions become more extensive, acid-fast rods increase in abundance until masses of them may be found in the macrophages and giant-cells. Whether the more or less constant edema recognized in grossly enlarged glands is due to the mechanical disturbance of circulation caused by the extensive hyperplasia or to other causes we do not know.

#### SUMMARY

1. A study has been made of 19 animals out of a herd of approximately 150 cattle. Sixteen of these were reactors to the avian tuberculin test for Johne's disease, and the remaining three were clinical cases. The ages of the cattle studied ranged from one and one-half to eleven years. Five animals had shown clinical symptoms, and one was a border-line case.

2. Grossly recognizable lesions were observed in 17 animals, all of which showed lesions in the small intestine at levels varying from ten feet from the abomasum to the cecum. Lesions were found in the cecum of eight animals, in the colon of eight, and in the rectum of five. Extensive lesions occurred in only two animals, neither of which gave significant clinical evidence of the disease, and but one of which showed the classic folding and corrugation of the folds.

3. The typical early intestinal lesion of diagnostic importance may be very limited in extent, and is described as a small oval or linear, slightly raised, glistening area of a pinkish-gray to reddish or occasionally steel-gray color, located on the crests of the folds.

4. No diagnostic lesions were observed in the lymph-nodes, except possibly edema and slight mottling of the cortex.

5. A technic is given for demonstrating acid-fast rods in tissue stained with carbol-fuchsin at room temperature.

6. Histological lesions are limited to the intestinal mucosa, submucosa, and contiguous lymph-nodes. All of the 19 animals showed microscopic lesions associated with acid-fast rods.

7. The microscopic lesion consists of one or a few macrophages, one or a few giant-cells, or a combination of the two

types of cells containing a variable number of acid-fast rods, with no evidence of degeneration of the cells.

8. Suggestions are advanced to explain the mode of entrance of Johne's bacillus into the tissue, its phenomenal multiplication, and its transportation through the lymphatics.

9. Two cases of extensive affection are described, wherein there are areas of superficial necrosis of the intestinal mucosa containing numerous acid-fast bacilli. The mechanical blocking of the lymph and blood capillaries, due to extreme hyperplasia of the cells of the stroma is suggested as a hypothetical cause of the necrosis. The theory is advanced that a less extensive superficial necrosis, not conspicuous in gross, could occur intermittently, and constitute an adequate explanation of the intermittent diarrhea and the emaciation characteristic of the disease.

10. In the data presented there is no positive correlation between the extent and number of the lesions and organisms found and the physical condition of the animal.

#### ACKNOWLEDGMENTS

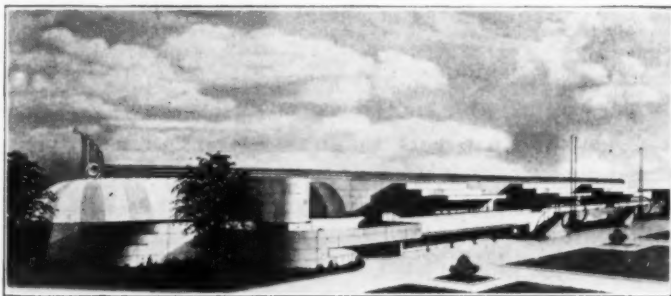
We are indebted to Dr. O. H. Core, of the Michigan State Department of Agriculture, through whose efforts the above cases were available for study; to Doctors Core and F. P. Calkins, also of the Michigan State Department of Agriculture, for assistance in making the autopsies on the 19 animals; and to Dr. W. A. Hagan, of the New York State Veterinary College, for furnishing the avian tuberculin which was used in testing the herd. We are indebted also to Mr. Frazelle Edwards, of the Department of Bacteriology, for making the photomicrographs illustrating this paper.

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AGRICULTURAL BUILDING AT A CENTURY OF PROGRESS

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## EXPERIMENTS ON FOWL-POX\*

By C. L. MARTIN, *Durham, N. H.*  
*University of New Hampshire*

Experiments on fowl-pox immunization have been carried on at the University of New Hampshire since 1926. At that time, work was begun to determine the immunity, the effect on egg-production, mortality, duration of immunity, and other factors produced by skin vaccination with a non-attenuated fowl-pox vaccine. The vaccination was done by the follicle method, that is, by removing three to six feathers on the leg of the bird and by painting the vaccine over the open follicles with a small brush.

By 1929 the following conclusions had been made:

1. Vaccination for the prevention of fowl-pox was seldom fatal to the bird.
2. The less number of follicles inoculated the less violent was the reaction from vaccination.
3. Any number of follicles used (from three to twelve), from which a "take" resulted, produced lasting immunity.
4. Vaccinated birds did not transmit fowl-pox to susceptible birds four months after vaccination.
5. Birds suffered less from the vaccination during the summer season.
6. Pullets and cockerels should be vaccinated after they have been culled and before the pullets come into production.
7. All susceptible birds on the farm should be vaccinated within a reasonably short time, unless adequate means of quarantine are at hand.
8. Mature birds which had not molted were thrown into a molt when vaccinated after the last of August.
9. Six-month-old pullets vaccinated after August 1 dropped one-fourth in egg-production and showed some molt.
10. Six- to ten-month-old pullets vaccinated after December 1 dropped 25 to 40 per cent in production.
11. Vigorous pullets not less than three nor over six months of age, that were vaccinated before August 1, responded most favorably.
12. Birds which were vaccinated three years previously were still immune. This was longer than the ordinary life of the bird.

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\*Presented at the sixty-ninth annual meeting of the American Veterinary Medical Association, Atlanta, Ga., August 23-26, 1932.

This same year (1929), our attention was called to what was reputed to be a more favorable method of vaccinating. This was known as the "stick method," which was done by making a slight transverse incision on the lateral surface of the unfeathered portion of the leg, near the body of the bird, with a fine-pointed scalpel which previously had been dipped in the vaccine. In view of the fact that other workers opposed this "stick method," we decided that experiments by this method were indicated.

Birds to the number of 7,500, vaccinated by the "stick method," produced as favorable results as the "follicle method," but with the following additional advantages:

1. Birds could be vaccinated at least three times as fast.
2. About one-third the amount of vaccine was required.
3. The vaccination reaction of the bird was less.
4. The number of head lesions was substantially reduced.

During the past two years, 176,350 doses of vaccine have been dispensed to poultrymen in New Hampshire and 48,775 doses to poultrymen in other states. No "vaccination break" has occurred. These results proved that the doubt concerning this method was unfounded.

We tried various lengths of incisions to determine the smallest necessary to confer immunity and with the least detriment to the flock. An incision as small as one-eighth of an inch was found to be sufficient to insure intradermal inoculation.

To regulate the depth of the incision, adhesive tape was wound around the blade of the knife several times, about  $\frac{1}{8}$  of an inch from the point. When used, this became saturated with the inoculant and assured the operator that a sufficient amount of vaccine had been introduced.

Upon examination, no difference could be found in the type of vehicle used. Sterile distilled water alone, or equal parts sterile distilled water and glycerine, were on a par.

To determine the best method of storing the virus, scabs ground and unground were stored in gelatine capsules in the refrigerator and at room temperature. The potency tests revealed, after eight months, that the material stored in the refrigerator, whether it be ground or unground, was potent. That which was stored at room temperature was practically impotent.

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To give real service, you must add something which cannot be bought or measured with money, and that is sincerity and integrity.—DONALD A. ADAMS.



## ON THE DISINFECTION OF AVIAN FECAL MATERIAL\*

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That numerous compounds successfully disinfect fecal material is an accepted fact, and all textbooks on bacteriology and sanitary science present a list of such substances and the dilutions to be used. The mode of application is seldom mentioned in these books, although any disinfectant is inefficient unless it is applied properly.

In practice, the degree of thoroughness in the use of the disinfectant varies from a very superficial spraying to a very vigorous scrubbing with soap or alkali water, followed by a liberal drenching with the disinfectant. A search of the literature failed to reveal any conclusive study of the disinfection of fecal matter by using the compounds that have been so widely recommended. True, experiments have been performed which demonstrated that pathogens, when added to fecal material, have been destroyed, but such conditions are not analogous to the actual conditions found in the field, as will be discussed later in this paper.

The following citations from leading textbooks and articles on disinfection give the present conception of disinfection of fecal material.

Jordan<sup>1</sup> states:

The sterilization of feces is carried out advantageously by the use of calcium hydroxid ( $\text{Ca}(\text{OH})_2$ ). In laboratory experiments, 1 per cent solution of freshly slaked lime in water has been found to kill nearly all pathogenic bacteria within a few hours. A 20 per cent solution mixed with an equal part of the feces and urine of a typhoid patient will bring about complete disinfection within an hour. The cheapness and high efficiency of freshly slaked lime render it the most useful of the common disinfectants for bowel discharges, the contents of privy vaults, and manure piles.

McClintic<sup>2</sup> states that stools of typhoid patients may be disinfected by the following agents: chlorinated lime, milk of lime, 5 per cent phenol, and 10 per cent formalin. Pope<sup>3</sup> recommends the following for stable disinfection: 1:1,000 mercuric chlorid, chlorinated lime, formalin, 5 per cent phenol, 2 per cent cresol, and 3 to 4 per cent liquor cresolis compositus. Hasseltine<sup>4</sup> rec-

\*Journal Article No. 113, New Series, from the Michigan Agricultural Experiment Station. Presented at the sixty-ninth annual meeting of the American Veterinary Medical Association, Atlanta, Ga., August 23-26, 1932.

ommends the use of 5 per cent phenol or 1 per cent cresol for disinfecting typhoid feces and sputum. Dorset<sup>5</sup> states:

The commercial cresols guaranteed to contain more than 90 per cent cresylic acid are relatively cheap and well suited to the disinfection of cars, barns and yards.

Ravenel<sup>6</sup> recommends the following disinfectants for sterilizing fecal material: chlorinated lime, milk of lime, mercuric chlorid, formalin and cresol. To anyone versed in a knowledge of disinfection, knowing the limiting factors of phenol coefficients, of albumin coefficients, of toxicity coefficients, and of penetrability of the various compounds, the group of substances listed and their recommended uses is the height of heterogeneity.

Recently, in a study of avian coccidia, it was necessary to destroy the bacteria in chicken feces without injury to the coccidia present. A search was made for a compound that would destroy all the microbial life present and still not injure the coccidia. Difficulties in the destruction of the bacteria were encountered with the more common disinfectants. The results of these studies, as far as the disinfection of feces is concerned, are presented in this study.

#### EXPERIMENTAL

As stated, this study originated in an attempt to find a disinfectant that would destroy completely all microbial life in the feces with the exception of the coccidia. In the first series of experiments, to speed the disinfecting action and to assure contact of the disinfectant with the bacteria, the feces, collected from chickens, were finely ground in a mortar, and strained through cheesecloth to remove all large lumps. The resulting suspension was a finely divided particulate mass of syrupy consistency. In each test-tube was placed 0.05 cc of this material and 10 cc of the disinfectant under study added, giving a ratio of one part of fecal material to 200 parts of the disinfectant. After the disinfectant was added, the tubes were stoppered with flamed corks and then were shaken constantly during the period of exposure. Exposures of 10 and 30 minutes were made. At the end of each period, the tubes were centrifugalized for one minute to precipitate the fecal material. The disinfectant was decanted off and an equal amount of sterile distilled water was added, thoroughly shaken and again centrifugalized.

This process was repeated from two to five times to remove all traces of the disinfectant, so transplants of the fecal material into nutrient broth and agar would not be inhibited from grow-

ing by the residual disinfectant that otherwise would be present. One-cc portions of the fecal matter were planted into lactose broth and plain nutrient agar plates. All tubes and plates were incubated at 37° C. for 48 hours before observations were made. In the first series of tests, the following disinfectants were used: colloidal iodine (Chandler) containing 0.4 per cent iodine; 1:500 mercuric chlorid; 10 per cent formalin; chlorinated lime (1 pound to 4 gallons of water); 10 per cent lye; and a 1 per cent solution of creolin. The results are presented in table I. The data show that 0.4 per cent colloidal iodine produced complete sterility; whereas the mercuric chlorid, formalin, chlorinated lime, and creolin failed to sterilize the material.

The counts reported were obtained by multiplying the number of colonies that developed on the plates by the dilution resulting from the three washings. The latter figure was obtained by plating an equivalent amount of the fecal material, in the absence of a disinfectant, after three washings to get the actual reduction in the number of organisms caused by the washing. The presence of *Escherichia coli* and *Pseudomonas fluorescens* indicates the possible inability of these compounds in this instance to effect destruction of the pathogens, as the resistance

TABLE I—Results of experiment to determine the efficiency of various agents, compared with 0.4 per cent colloidal iodine, for the disinfection of avian fecal material.

DISINFECTANT	TIME OF EXPOSURE			
	10 MINUTES		30 MINUTES	
	BACTERIA COUNT	LACTOSE BROTH	BACTERIA COUNT	LACTOSE BROTH
Colloidal iodine (Chandler) (0.4%) . . . . .	0	0	0	0
HgCl <sub>2</sub> (1:500) . . . . .	0	Growth	0	Growth
Formalin (10%) . . . . .	565,000	<i>E. coli</i> and <i>Ps. fluorescens</i>	1,994,000	<i>E. coli</i> and <i>Ps. fluorescens</i>
Lye (10%) . . . . .	565,000	<i>E. coli</i> and <i>Ps. fluorescens</i>	783,000	<i>E. coli</i> and <i>Ps. fluorescens</i>
Chlorinated lime (1 lb. to 4 gal. water) . . . . .	855,000	<i>E. coli</i> and <i>Ps. fluorescens</i>	2,283,000	<i>E. coli</i> and <i>Ps. fluorescens</i>
Creolin (1%) . . . . .	5,195,000	Nogrowth*	6,298,000	Nogrowth†
Autoclaved fecal material (control) . . . . .	0	0	0	0

\*The HgCl<sub>2</sub> was not neutralized.

†Antiseptic action due to residual cresol carried over in washing process.

of these organisms is approximately the same as most of the non-sporogenic pathogens. As previously stated, the material used in this experiment had been passed through a cheesecloth sieve to eliminate all large particles that would be difficult to disinfect; thus the inability of these compounds to destroy the bacteria under such favorable conditions would indicate even greater inefficiency under field conditions.

In a second series of experiments, the amount of colloidal iodine was decreased to 0.2 per cent iodine content and again compared with the other disinfectants under practically the same conditions as before. The data are presented in table II. In this series, the colloidal iodine, in both the 0.2 and 0.4 per cent solutions, effected complete sterility while the others failed. Both high bacteria counts and *Esch. coli* were obtained. The 10 per cent lye, however, did sterilize in 30 minutes but not in 10 minutes.

TABLE II—Results of experiment to determine the efficiency of various agents, compared with 0.2 per cent colloidal iodine, for the disinfection of avian fecal material.

DISINFECTANT	WASH- INGS	TIME OF EXPOSURE			
		10 MINUTES		30 MINUTES	
		BACTERIA COUNT	LACTOSE BROTH	BACTERIA COUNT	LACTOSE BROTH
Colloidal iodine (Chandler) (0.2%)*	2	0	0	0	Sl. growth
Colloidal iodine (Chandler) (0.4%)*	2	0	0	0	0
Chlorinated lime.....	2	308	<i>E. coli</i>	185	<i>E. coli</i>
Creolin (1%).....	2	44	<i>E. coli</i>	35	Growth
Formalin (10%).....	2	177	<i>E. coli</i>	124	Growth
Lye (10%).....	2	77	Growth	0	Growth
Sterile water (control).	2	0	0	0	0

\*The disinfectant was destroyed by neutralization at end of exposure.

Because of the inability of these compounds to effect sterilization of avian fecal material, the question arose as to their efficiency upon fecal matter from other sources. Accordingly, human feces were emulsified, screened, and washed in a manner similar to that used for the avian material. Similar results were obtained. This would seem to indicate that such widely known compounds as tincture of iodine, mercuric chlorid, formalin, and creolin are not so efficient as disinfectants as the textbooks on this subject would lead one to believe.

In a fourth series of experiments, some coccidial material collected from the cecums of six chicks was screened carefully, washed several times, and then stored in the refrigerator for several weeks. After this period of storage, the material was in a very finely divided state and seemed to offer an ideal opportunity for the disinfectant to effect sterilization. The results are presented in table III. The results are very similar to those obtained in the other experiments.

A number of other disinfectants were tried, namely metaphen, potassium permanganate, potassium dichromate, and copper sulfate. None of these compounds could effect sterilization, except the potassium dichromate and then only after exposure for 30 hours.

TABLE III—Results of experiment to determine the efficiency of various agents, compared with colloidal iodine, for the disinfection of coccidial material stored in refrigerator several weeks.

DISINFECTANT	TIME OF EXPOSURE			
	10 MINUTES		30 MINUTES	
	BACTERIA COUNT	LACTOSE BROTH	BACTERIA COUNT	LACTOSE BROTH
Colloidal iodine (Chandler) (0.2%)*.....	0	0	0	0
Colloidal iodine (Chandler) (0.4%)*.....	0	0	0	0
Tincture of iodine.....	105,000	+	7,000	+
HgCl <sub>2</sub> (1:500).....	212,000	+	91,000	+
Formalin (2%).....	91,000	+	553,000	+
Creolin (1%).....	301,000	+	777,000	+

\*The disinfectant was destroyed by neutralization at end of exposure.

#### DISCUSSION

These series of experiments demonstrated that only one disinfectant, namely, colloidal iodine (Chandler), was able to produce complete sterilization of avian fecal matter which had been washed and screened to present a very finely divided suspended material for the action of the disinfectant. These data become exceedingly interesting when it is recalled that the compounds that failed to sterilize have been highly recommended for years as efficient disinfectants for stable and hen-house use. The inability of these compounds to destroy such organisms as *Esch. coli* and *Ps. fluorescens* in the manure, when the ratio of fecal matter to disinfectant was 1 to 200, is highly significant. If

these organisms survive, then the non-sporogenic pathogens as well as the sporogenic bacteria also would survive.

The fact that these compounds failed to disinfect is not new. In 1895, Vincent<sup>7</sup> presented experiments conducted in a very similar manner. He demonstrated that, with the usually recommended doses of the common disinfectants, mercuric chlorid, quick lime, lye, phenol, copper sulfate, and cresol, very unsatisfactory results were obtained after exposure for 24 hours. He was able to kill specific pathogens implanted artificially into the fecal material, but such experiments have limited value, because introduced organisms remain outside the particle of fecal matter and are attacked easily by the disinfectant, whereas organisms naturally present are enmeshed in the particles of fecal matter and are protected against the disinfectant unless it has high penetrating powers.

The experiments presented in this paper demonstrated the inability of most disinfectants to penetrate organic particles. The reduction in number of bacteria that did occur was due to the fact that organisms killed were free in the suspension. The surviving bacteria undoubtedly were intimately mixed in the particulate matter and thus were protected against destruction. The repeated washing to remove the residual disinfectant liberated them mechanically. This was borne out by the fact that extended shaking gave increasing counts. Colloidal iodine has a high penetrability, as Chandler<sup>8</sup> has demonstrated, in its ability to penetrate the coccidial oöcysts, whereas all other disinfectants have been unsuccessful. Its ability to penetrate the fecal particles is demonstrated in these experiments by the fact that in all instances the material was rendered sterile by exposure for 10 minutes.

In all cases where efficient sterilization is necessary, depending on the amount of iodine-fixing matter present, colloidal iodine would seem advisable. In all cases of disinfection, the removal of excess organic matter is essential, of course. For example, in floor disinfection of chicken-houses or stables, the surface should be cleaned thoroughly to remove as much of the organic matter as possible. Then the floor should be disinfected by a liberal application of the disinfectant, three gallons to each 100 square feet. Since colloidal iodine, like many other compounds, combines readily with organic matter, the elimination of the organic material increases its efficiency and decreases the amount necessary for thorough disinfection. The cost, volume for volume, of the diluted colloidal iodine compares favorably with the more com-



monly known disinfectants and, under conditions of proper preparation of the surface to be disinfected, this compound appears to be an ideal disinfectant. In addition to its bactericidal value, it is the only disinfectant which will kill worm eggs and coccidial oöcysts within practical time limits.

The data here presented show quite vividly the need of cleanliness as a necessary preliminary to disinfection. No disinfectant, including colloidal iodine, can disinfect economically or efficiently in the presence of excessive amounts of organic matter.

#### CONCLUSIONS

Colloidal iodine (Chandler) was found to sterilize avian fecal material, when used in a 0.2 per cent solution at the rate of 200 parts to 1 part of fecal matter. Under similar conditions, 1:500 mercuric chlorid, tincture of iodine (full strength), chlorinated lime (1 pound to 4 gallons of water), 10 per cent formalin, 10 per cent lye, and a 1 per cent solution of creolin failed. The failure of these compounds to sterilize a small amount of finely divided avian fecal matter was due to their inability to penetrate solid particles of organic matter.

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### Bring the Kiddies to Chicago

For those veterinarians who are planning to bring their families with them to the Chicago convention, the Palmer House has good news. It will take care of the younger children and give them the best of attention in the Rooftop Circus Playroom, a large, completely equipped nursery and play place on the 25th floor. This activity is in charge of trained attendants whose aim is to see that the children are amused while "mother and dad" are attending the meeting. There is no charge for children over three years of age. For those under three, the charge is 75 cents an hour.

## THE RELATIONSHIP OF THE VETERINARY PROFESSION TO HUMANE ORGANIZATIONS\*

By RAYMOND J. GARBUTT, *New York, N. Y.*

*Chief Veterinarian, American Society for the Prevention of Cruelty to Animals*

In view of the fact that many members are unfamiliar with the aspect of the humane movement and its relation to the veterinary profession, I have prepared this article, having in mind only the clarification of a situation which is growing more important from year to year. It might be well to go back to the year 1822, when the British House of Parliament passed an act to prevent cruelty to animals. This bill was introduced and sponsored by Richard Martin, later known as "Humanity Martin," Irish member of the House. Two years later, the Society for the Prevention of Cruelty to Animals was delegated to enforce the new law. In 1866, Henry Bergh, who did so much for animal welfare in this country and whose name among Christians and humanitarians will live forever, obtained the charter for the American Society for the Prevention of Cruelty to Animals in New York City. Incidentally, the animal society was established before the Society for the Prevention of Cruelty to Children and the former was instrumental in the founding of the latter.

If I may digress for a moment and if you will bear with me, I will relate the circumstances: In 1873, Mrs. Etta Angel Wheeler, a social worker in the slums of New York, learned about the sad plight of a child by the name of Mary Ellen. For several months she sought means to remove her from the clutches of brutal foster parents, who beat her small body with a leather whip until she was a mass of cuts and bruises. The police, the courts and the charities offered no relief. Mrs. Wheeler wrote, in after years, that she often had been tempted to apply to the American Society for the Prevention of Cruelty to Animals, but had hesitated going to the animal society on behalf of "Mary Ellen." She finally made up her mind and interviewed Mr. Bergh, sent him a statement of the case and within forty-eight hours the child was brought before Judge Lawrence of the Supreme Court. A writer described the scene:

I was in a court room filled with men with pale, stern faces. I saw a child brought into the room, carried in a horse blanket, at

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the sight of which men wept aloud. I saw it laid at the feet of the Judge, who turned his face away, and in the stillness of that room I heard a voice raised claiming for that child the protection men had denied it, in the name of the homeless cur of the streets. And I heard again the story of Mary Ellen, the story that stirred the soul of a city and roused the conscience of a world that had forgotten. The sweet-faced missionary who found Mary Ellen was there. She told how the poor consumptive, at whose bedside in the dark tenement she daily read the Bible, could not die in peace while the child next door, called Mary Ellen, was beaten and tortured, and how on weary feet she went from door to door of the powerful, begging mercy in order that her friend might die in peace. The police said: "Furnish us with evidence to prove crime." The charitable said: "It is dangerous to interfere between parent and child." But, undismayed, she kept on and her woman's heart rebelled against it all, and so she sought the great friend of dumb brutes who made a way. "The child is an animal," he said. "If there is no justice for it as a human being, it shall at least have the rights of a cur of the street. It shall not be abused." And as I looked, I knew I was where the first chapter of the children's rights was written under warrant of that made out for the dog. From that stuffy court room came forth the seed which germinated and led to the founding of the American Society for the Prevention of Cruelty to Children.

From that time on, societies for the prevention of cruelty to animals and children have been founded in all parts of the world, until today they number about one thousand. In Germany there are about three hundred societies, and numerous organizations in France, Austria, Italy, and generally throughout Europe, Australia and New Zealand, most of these having been established during the past fifty years.

In Europe, kings and queens and members of the royal families lend prestige and protection to these organizations. In America, past presidents and vice-presidents of the United States, congressmen, senators, bankers, lawyers and leading celebrities hold active and honorary positions in these organizations, and like the veterinary profession, these societies hold county, state, national and international conferences which are attended by humanitarians from all over the world.

The above historical facts show the origin and extensiveness of the humane movement. As shown, it is active throughout the world and has been so for more than fifty years.

#### HUMANE SOCIETY HOSPITALS

Much of the criticism against humane society hospitals has been without justification. There are veterinarians who even have questioned the right of societies to maintain hospitals. Let us go back to the fall of 1912, at which time the American Society for the Prevention of Cruelty to Animals opened its first animal hospital, located at 24th Street and Avenue A,

New York. Up to that time, the Society maintained no hospital but sent a sick or injured animal either to the owner's home or stable as the case might be, or made arrangements for a local veterinarian to care for the patients. As the Society grew in popularity and animal protection work became more intensified, it soon became apparent that it would be better to build a hospital and to centralize control. A survey showed a few modern hospitals in New York City but most of them were insanitary, dark and altogether unfitted for caring for animal patients.

The A. S. P. C. A. Hospital, planned and built by courageous men and women of vision, stands today as one of the finest equipped institutions of its kind in America and a monument to those far-sighted individuals who created it. At first it was patronized more or less by those who could afford to pay, but as time passed it became the refuge for the pets of little children of the poor, broken-hearted men and women, and those in moderate circumstances who preferred patronizing a humane hospital to one of a practitioner. At the present time it is manned by a staff of three graduate veterinarians. The societies know full well that incompetent men would soon place the organizations in ill repute, and they know also that competent veterinarians can ill afford to give daily of time and skill without compensation for any length of time. Most humane hospitals have been opened and operated by veterinarians who served gratuitously in the early periods of formation, but as work increased and the lack of control of free employees became more apparent, the humane hospitals centralized control, employed competent men and remunerated them on a weekly or monthly basis. All large organizations have found this to be the better way, and the societies know it is justified.

They can point to the United States Army, which abolished its contract veterinarians for regular army officers, to the U. S. Bureau of Animal Industry, which employs about 1,300 veterinarians, and to the large dairy companies, railroads, and express companies, which employ their own veterinarians. Humane societies are surely within the law and certainly have the right to employ their own staffs rather than contract for their veterinary work. Some veterinarians have stated that humane society hospitals deprived them of some of their practice. That is so, to some extent; but are not the graduate licensed veterinarians who are employed by humane societies entitled to earn a livelihood? Then, too, some veterinarians state that humane society hospitals should not accept, without charge, patients brought to them, arguing that the poor man, woman or child who cannot

afford veterinary fees has no right to have a pet. My answer is that we, as Christians and humanitarians, have not the right to deprive the poor and unfortunate of their pets, that many times a broken-hearted man or woman, possibly ones who have seen better times, find great comfort and solace with their animal friends. If you would see some of these clients and learn to know them as I do, you, I think, would feel the same way, particularly so if you saw the look of gratitude, as tears have been brushed aside, when some of our little children have found treatment and kindness for their pets at our hospital and clinic. In any large city you will find a number of people broken in mind and body in the fight for existence. Witness the large hospitals and sanitariums, scattered throughout the big cities, which care for these unfortunates. The humane society hospitals have a duty to perform for the animal world as have our Bellevue and Post-Graduate hospitals, of New York, or Johns Hopkins, of Baltimore.

The A. S. P. C. A. Hospital has never paid expenses; it has been and probably always will be run at a loss. The present disturbed economic conditions have placed a tremendous burden on it. I believe that a large part of our clientele would have to have their pets destroyed were it not for our activities. Most of them cannot pay for their own medical treatment, let alone that of their pets.

#### PUBLICITY

Humane society hospitals and their staffs frequently have been censored because of the amount of publicity they receive. The case of Mary Ellen might never have been known had it not been for the publicity given it by the powerful press. Publicity is the humane society's blood-stream. It cannot be shut off.

#### UNFAIR TACTICS

Possibly the hospitals (humane societies), or at least some of them, have gone to the extreme to satisfy the public and increase their revenue when they permitted the boarding of dogs, clipping, plucking, unsexing, and the performing of various veterinary plastic operations. When these abuses were pointed out, representatives of the American Veterinary Medical Association and the American Humane Association conferred and, after several meetings, a code of ethics was drawn up. Through these splendid efforts mutual benefits have accrued to both organizations. The A. S. P. C. A. Hospital, on several occasions, has permitted meetings and clinics of various veterinary organiza-

tions to be held in its building without cost. It aids and assists all qualified legitimate practitioners with any of their cases. For a small or nominal sum it permits the use of its x-ray for equine or canine patients, its operating rooms or any of its wards.

The tendency on the part of some veterinarians to be hypercritical came partly because they disobeyed the laws of supply and demand. Believing that there was a shortage of veterinarians in New York City and suburbs, many recent graduates have come to the metropolitan area to practice. The result has been many disappointed men. It is the consensus among the more prominent veterinarians that New York City has had an oversupply of veterinarians for some time past and for a long time prior to the depression.

#### THE AMERICAN HUMANE ASSOCIATION

The American Humane Association is a federation of humane societies and individuals which plays a strong part in shaping the policies of the local humane organizations. It guides and aids those societies which call upon it, and extends a helping hand. Its influence is local, national and world-wide, and its members are scattered throughout the four corners of the globe. Under the direction of Mr. Sydney H. Coleman, its president, it has been administered wisely and efficiently. *The National Humane Review*, one of the most popular humane magazines, and one to which every veterinarian should subscribe, is published by this organization. The American Humane Association was the organization which sponsored the bill making it unlawful to crop the ears of dogs. It was ably assisted in this movement by many of America's most famous veterinarians.

From observations based on thirteen years of experience in humane society work, in one of America's largest animal hospitals, my conclusions and recommendations are as follows: Granting that these hospitals exist by right of public approval, legal authorization and necessity, we as veterinarians and humanitarians should give to these organizations our fullest coöperation and support, and take an active part in all movements for the betterment of the animal kingdom. We should combine our interests, when possible, by building in cities veterinary hospitals which will be a credit to the men who staff them, as well as to the profession. Discourage when possible the creation of small, insanitary, inadequately equipped hospitals. Encourage the deans and faculties of our veterinary schools to concentrate on the quality rather than the number of graduates,



with full realization that we must give to the public better veterinary service which the public demands. In keeping with the medical, dental and allied professions, we should insist that all veterinary schools immediately go on a five-year basis, with one year of pre-veterinary work and four years of veterinary studies, and then plan for two years of pre-veterinary work and a four-year course. Failure to comply should result in a classification of the schools.

Because some graduate veterinarians with strong commercial instincts have been accused of mercenarism in exploiting the suffering of dumb animals, we should appeal to the deans and faculties to investigate, if necessary, the background of all students, rather than permit individuals to be graduated and to bring shame and dishonor to our noble profession. It might be well to consider seriously the advisability of calling for more veterinarians until we have raised our standards and increased the remuneration of our graduates.

Quite obviously, steps must be taken to prevent the recent graduate from advertising as a small-animal specialist until his capabilities have been passed upon and recognition given by the A. V. M. A. Humane society hospitals receive numerous complaints regarding practitioners, who have been graduated recently, but masquerading as specialists.

Knowing the value of humane society work, we should endeavor to inculcate humane ideals on the student body of all veterinary colleges. A series of special lectures should be given to veterinary students, dealing with the history of the humane movement and its relation to the veterinary profession.

In concluding, may I state that we should look to the activities of the humane organizations in promoting publicity as one of the greatest forces that exist in selling the veterinary profession to the American public. It has told the story of "Mary Ellen" to millions; it has said, "Be kind to animals," through its mass of literature which has gone to every corner of the land. From radio and pulpit, from some of our most distinguished educators has gone the cry, "Don't abuse. Care for your pet. Take him to a veterinarian when ill." An advertising campaign has been carried on relentlessly in behalf of the veterinary profession, which has brought to it prestige, publicity and financial reward, paid for by the humane organizations.

I sincerely believe that because of the birth of the humane movement the veterinary profession has been made a better profession.

## ANAPLASMOSIS

### VI. The Morphology of Anaplasma\*

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U. S. Department of Agriculture

The typical form of *Anaplasma* is that of a stained dot situated on the margin (*A. marginale*) or in the interior (*A. centrale*) of the erythrocyte. Wenyon, in his Protozoölogy, describes *Anaplasma* as a spherical granule which stains a bright red with Romanowsky stains. De Kock and Quinlan state that *Anaplasma* is not completely spherical but that the contour here and there shows slight protrusions, as if "sprouting."

Sieber<sup>34</sup> describes *Anaplasma* as a purple-bluish granule of variable size which, after lengthy staining, shows, with good illumination, a small black body in the center or on the margin of the granule. Helm states that *Anaplasma* is at times oval or pear-shaped. Gomes de Faria<sup>35</sup> describes the appearance of *Anaplasma* as follows:

In dry fixed preparations stained with Giemsa, *Anaplasma* consists of rounded or oval bodies of 0.1 to 0.5 $\mu$  in diameter, which take the red violet color of chromatin, mostly situated on the margin and more rarely in the center or other part of the red cell. The occurrence of a clear halo around the parasite is not constant.

Often and especially in the beginning of an infection, extremely small forms are encountered. These appear as very small intracorporeal points, sometimes less than 0.1 $\mu$ . They are close to the limit of microscopical visibility. These forms seem to have been seen before by Lignières.

Other bodies, which we do not believe to have been described before, are small rod-forms, sometimes regular, at other times irregular in outline, generally evenly stained, having at times, although rarely, the appearance of bipolar staining; rod-forms which show a resemblance to *Bartonella bacilliformis*, described as the cause of Oroya fever, and to *Bartonella muris*, found in splenectomized rats, Mayer.<sup>36</sup> These forms, which measure 0.3—0.4 $\mu$  in length and 0.1—0.15 $\mu$  in width, are seen mostly in the circulating blood in the beginning of an infection and also in organ smears, especially those of the spleen, in which they are quite numerous in certain cases. Besides these regular rod-forms, there are at times comma-like forms, with a dense spherical portion with a filamentous tail, which at times appears double. These forms correspond to those seen by Quevedo and Descaseaux. Quevedo, in one of his articles, considered these forms as being due to the throwing out of fine prolongations in the shape of flagella, and Descaseaux mentions their occurrence in organ smears of animals dead of anaplasmosis.

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Gomes de Faria further mentions the occurrence of triangular and quadrangular forms, of vacuolated bodies with dense chromatin-like staining margins or centers.

All of the forms mentioned by Gomes de Faria have been found by us both in naturally occurring and in experimentally produced cases of anaplasmosis. Through the courtesy of Dr. C. W. Rees, the writer was enabled to examine four blood-smears from a case of anaplasmosis showing a relapse following splenectomy. These slides present a most remarkable picture. In addition to the classical, deeply and uniformly staining "marginal and central" points of anaplasmosis, there are present what, for the sake of convenience, may be termed diads, triads and multiple points. Many rounded bodies of irregular contour with deeply purplish-stained portions in the margin and lightly stained centers, small, reddish-stained rod-forms, and minute, barely visible points are found. Similar forms, although not in such numbers nor in such bewildering variety, have been found in other cases and one possible interpretation of these slides is that they represent rapidly dividing and multiplying anaplasmas no longer subject to the inhibitory and restraining forces of the spleen. (See plates I and II.)

If these bodies are *Anaplasma*, the picture presented by these slides is an additional argument in favor of the interpretation of *Anaplasma* as a living organism. In view of the fact that the classical descriptions of *Anaplasma* do not include such bodies and are confined to stained dots, the interpretation suggested here requires more extended consideration. Certainly the blood-picture in cases of anaplasmosis in various parts of the United States is more complex than that described for anaplasmosis elsewhere, and the stained bodies in the erythrocytes do not correspond to known and described pathological elements of a non-parasitic nature.

#### CULTURE OF ANAPLASMA IN VITRO

Veglia<sup>37</sup> and Helm report the increase of *Anaplasma* in culture-tubes. Helm used Bass' medium, *i. e.*, blood plus 50 per cent glucose. Veglia used pure defibrinated blood, physiologic salt solution, sodium citrate solution and ordinary bouillon as his culture media. Wenyon suggests that the growth and increase reported by Veglia may have been due to a contamination of the cultures and that the forms seen in the cultures may have been cocci. This assumption does not appear to be warranted. It may be taken for granted that Veglia knew the difference between cocci and

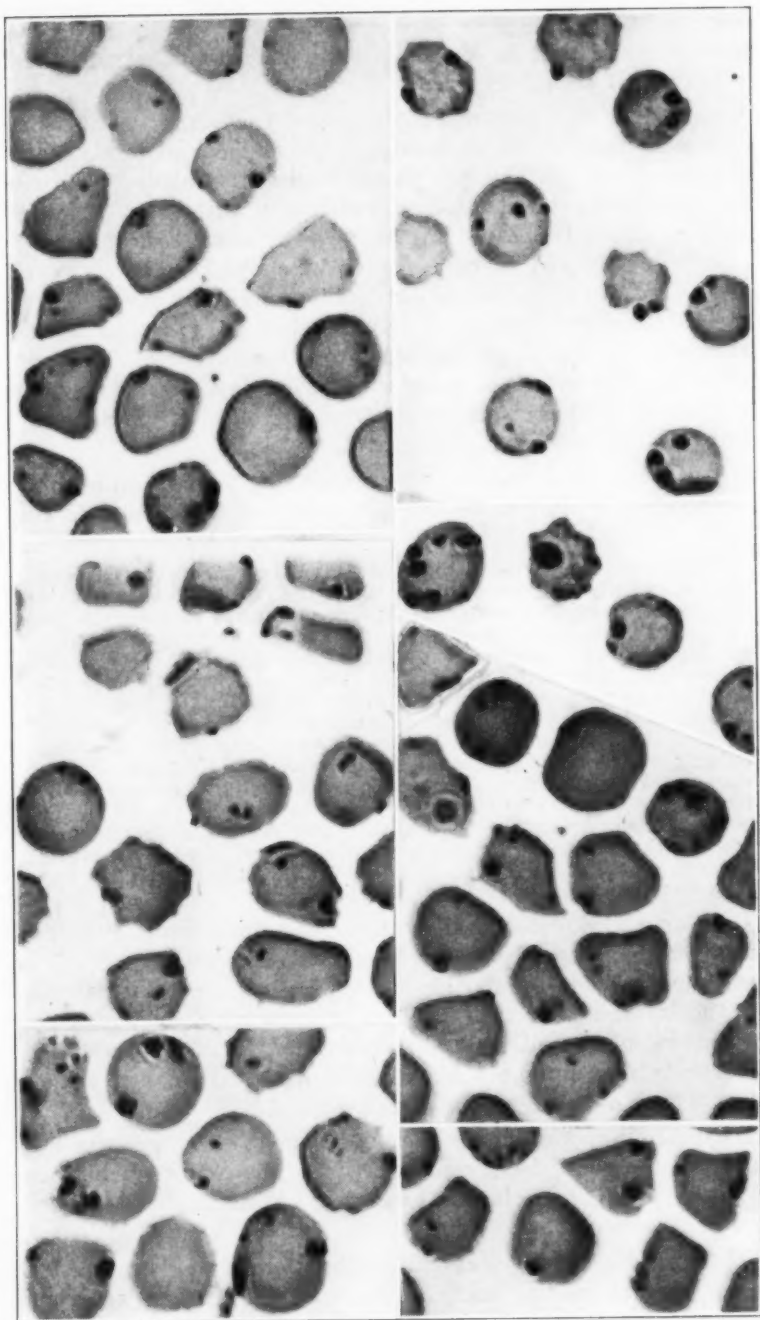


PLATE I  
Photomicrographs of Anaplasma occurring in blood in fatal case of ana-  
plasmosis following splenectomy.

Anaplasma and that he would have recognized contamination in his cultures if it had occurred.

Gomes de Faria cultured bovine blood containing Anaplasma on vitamin-agar to which bovine brain tissue and horse blood had been added and obtained in the water of condensation some small organisms which stained red violet with Giemsa stain. These organisms appeared in the form of small rods about 0.5 to 1 $\mu$  in length and they resembled in shape certain forms of Rickettsia. Three successful subinoculations were made. Three tubes of the third transplant were washed with normal bovine serum and the washings injected into a healthy cow. This cow suffered a mild attack of anaplasmosis, 90 days later. Further attempts to isolate this organism from the blood of animals containing Anaplasma were unsuccessful.

After mentioning various media which he used in an attempt to cultivate Anaplasma, de Faria summarizes his results as follows:

Anaplasma maintain themselves in culture media for a long time, especially in those media in which the red blood cells remain well preserved. The bodies (Anaplasma) remain enclosed in the red blood cells without changing their morphological characters or their staining properties. A small percentage of Anaplasma are encountered free in the plasma and they appear sometimes as isolated cocci or diplococci or more rarely as small, irregular, streptococcic chains. This transformation, which may occur also in defibrinated blood, may continue for a very long time. We have found them (Anaplasma), with their morphological characters unchanged, 120 days after being added to the culture medium. The free forms begin to appear a few days after being placed in the culture medium; in blood-broth they are seen most abundantly after 20 to 30 days of cultivation. But when transfer to new media is attempted they show no signs of multiplication, neither are any new forms, indicating growth, observed.

De Faria also notes that he has been unable to notice any multiplication when blood containing Anaplasma is added to fresh, non-immune blood. He states, further, that, in his opinion, the intraglobular multiplication *in vitro* noted by Veglia and Quevedo cannot be interpreted as definite signs of multiplication. He reports that attempts to infect animals with cultures more than 30 days old always gave negative results.

Dschunkowsky<sup>38</sup> discusses the development of Anaplasma but, since he apparently was concerned with the anaplasmoid form of a species of Theileria, his paper has no bearing on the question under discussion.

The writer's attempts at cultivation were as follows: After trying several media, such as Noguchi's leptospira agar and blood-agar, during the preliminary work in Baton Rouge in

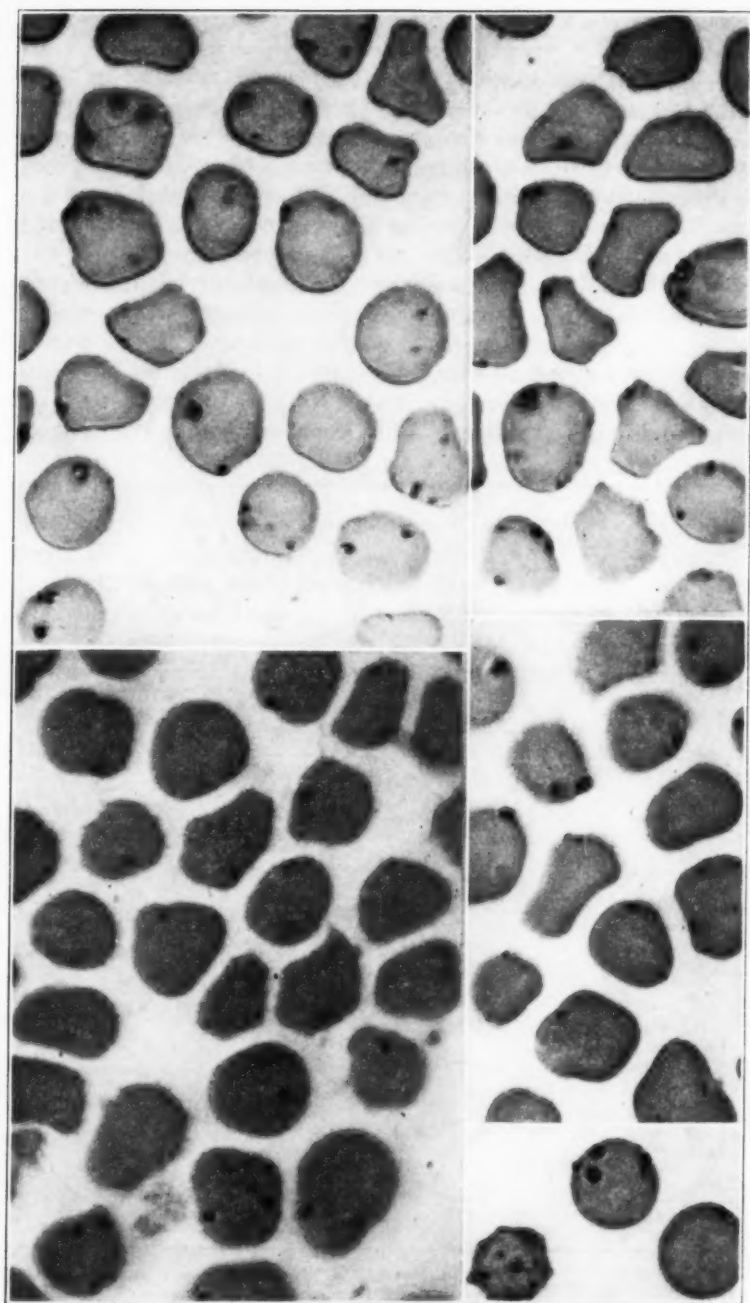


PLATE II  
Photomicrographs of Anaplasma occurring in blood in fatal case of anaplasmosis following splenectomy.



1927-1928 without much success, the second attempt, at Jeanerette was confined to Bass' method, *viz.*, the use of defibrinated or citrated blood to which 1 per cent of 50 per cent dextrose solution was added. The blood of six animals (16, 17, 20, 22, 27 and 29) was cultured in this manner. Culture 22 became contaminated and was discarded. The changes occurring in the other cultures are indicated in plate III. These changes definitely suggest multiplication of an organism by simple division. Bearing in mind Wenyon's criticism of Veglia's cultural work on *Anaplasma*, the blood which was used for cultural purposes according to Bass' method also was inoculated into dextrose broth and on Krumwiede's triple sugar agar. No growth was detected at any time in these cultures. This same procedure was followed

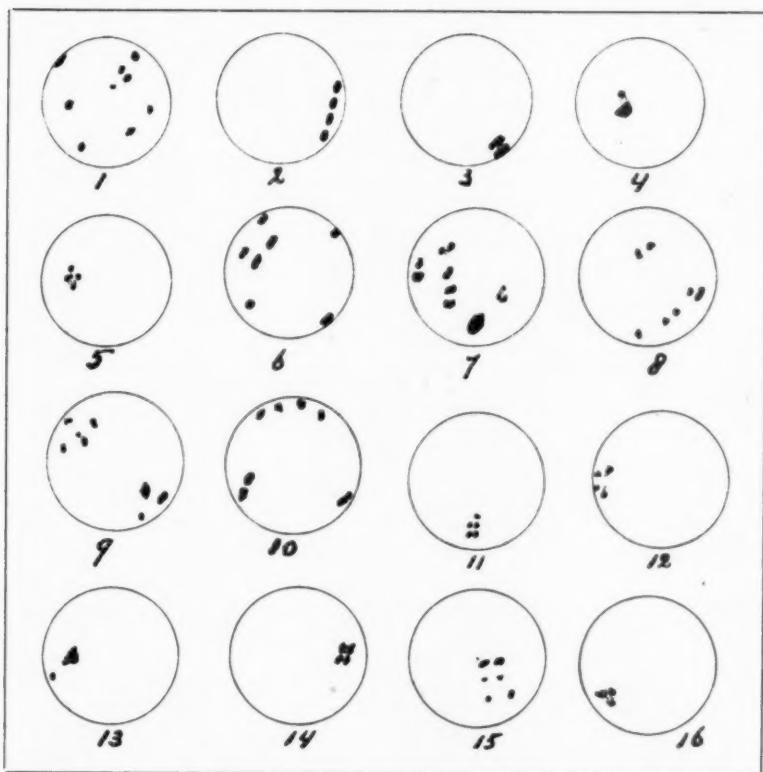


PLATE III

FIGS. 1-7. *Anaplasma* on 5th day of culture.  
 FIGS. 8-10. *Anaplasma* on 7th day of culture.  
 FIGS. 11-14. *Anaplasma* on 18th day of culture.  
 FIGS. 15-16. *Anaplasma* on 20th day of culture.

with the same result when apparent division of *Anaplasma* occurred in the red cell. In the culture of the blood of animal 22, where the smear examination suggested contamination, dextrose-broth cultures confirmed this suspicion within 24 hours. We feel, therefore, that the changes observed as occurring in the red cells were not the result of any bacterial growth.

A small amount of blood from the culture of animal 20 was added to 2 cc of blood from a normal calf in order to determine whether any appreciable growth and invasion of new blood cells could be noted. Two tubes of blood from this calf were kept as controls. While changes similar to those in the other cultures occurred, it could not be determined whether new blood cells became infected. The blood in the control tubes remained unchanged. No *Anaplasma* or bodies resembling *Anaplasma* were found in them at any time.

Cultures were made also from the blood of cows 19 and 22, in order to determine whether Lestoquard's<sup>39</sup> findings in regard to ovine *Anaplasma* could be confirmed. This author found that when blood, taken from an animal which has recovered from an attack of anaplasmosis and at a time when *Anaplasma* are scarce in the peripheral circulation, is cultured, the *Anaplasma* begin to increase appreciably in numbers at the end of 72 hours. In

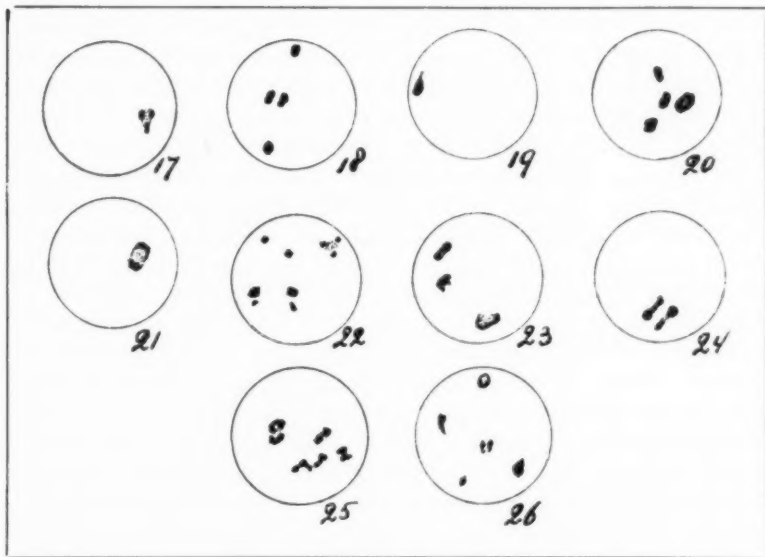


PLATE IV

FIGS. 17-26. *Anaplasma* in blood in fatal field case of anaplasmosis.

our cultures from animals 19 and 22, no increase could be detected in periods of 15 and 13 days, respectively. We, therefore, were unable to confirm Lestoquard's findings.

A comparison of the results obtained on culture with some slides obtained from actual cases of anaplasmosis may be of interest. Plate III represents the appearance of *Anaplasma* in cultures. Plate IV represents the appearance of *Anaplasma* in a fatal field case of anaplasmosis, and plates I and II represent the appearance of *Anaplasma* in a fatal case of anaplasmosis following splenectomy. This comparison leads to the conclusion that the forms obtained in culture are actually dividing and multiplying forms of *Anaplasma* and it suggests that there is a closer affinity between *Anaplasma* and *Bartonella* than between *Anaplasma* and *Piroplasma*.

#### DISCUSSION

It is quite evident that in Louisiana we have to deal with the disease of cattle known as anaplasmosis. The clinical symptoms and the antemortem and postmortem pathology are sufficiently well known to preclude the need of any further discussion.

The method whereby the disease is transmitted from animal to animal remains an interesting question. In the areas where the disease is prevalent, ticks usually have been considered as the vectors. This supposition has received experimental confirmation at the hands of competent investigators in different countries and it is for this reason that the Zoölogical Division of the Bureau of Animal Industry has been devoting its efforts in the last couple of years to determining which of the ticks occurring in Louisiana may act as transmitters of this disease. The result of these efforts has been that four ticks have been shown experimentally to be capable of transmitting the disease, viz., *Boöphilus annulatus*, *Rhipicephalus sanguineus*, *Dermacentor variabilis*, and *D. andersoni*. In view of the fact that most of the territory in which the disease occurs is "tick free," i. e., free from *Boöphilus annulatus*, only the last three ticks named need to be considered.

The objection which commonly is raised to accepting ticks as the habitual carriers of this disease in Louisiana is that so far no ticks have ever been found associated with field cases or field outbreaks of anaplasmosis in Louisiana. Against this objection it has been stated that, since these are three-host ticks, they drop off the animal and disappear long before clinical symptoms of the disease develop. One may urge that in areas where large numbers of cases of anaplasmosis occur over a period of several

months and these cases are treated by veterinarians who have passed through the old days of the campaign against the cattle tick, one might reasonably expect that if these cases are consistently the result of tick infestation the ticks would be found some time in some of the herds in which these cases occur, especially after these men have been cautioned to examine the animals for the presence of ticks. It has been argued that seed ticks are hard to find. While this argument is valid in the case of unengorged seed ticks, it would seem that engorged seed ticks or engorged nymphs are not hard to locate if a thorough manual examination is made. The Zoölogical Division constantly receives, for determination, seed ticks and nymphs collected on cattle by inspectors of the Tick Eradication Division. These inspectors, it should be kept in mind, are trained to find ticks. However, it would be desirable that some efforts be made to harmonize the actual happenings in the field with the experimental findings of the laboratory. As matters stand, the only convincing evidence in regard to biological transmission incriminates ticks of several genera and a large number of species.

One group of investigators offers some evidence, at the present time largely unconfirmed, that biting Diptera of the family Tabanidae may serve as mechanical vectors. The idea that these and similar insects may serve as transmitters of this disease is not new. Cases of anaplasmosis have been reported in the literature in which some such means of transmission seems to offer a plausible explanation as to the manner in which the animals could have acquired the disease. However, biting Diptera are ubiquitous and they can easily be invoked as assumed transmitters of any blood parasite, protozoan or bacterial. Many, rigidly controlled experiments, therefore, will be required to establish definitely their rôle in connection with the transmission of this disease.

Another point of perennial interest in connection with this disease is the question of etiology. While for all practical purposes the appearance of so-called *Anaplasma* in the red blood cells, together with the clinical picture of severe anemia, derangement of the digestive functions, high temperature and more or less icterus are sufficient to make a diagnosis of anaplasmosis, still the question as to whether *Anaplasma* is a parasite and the cause of the disease, or a by-product resulting from the disease, is not definitely settled and the question of etiology remains interesting and of scientific and practical importance. A sustained attack upon this phase of the problem of anaplasmosis,

both by artificial cultivation and by filtration, seems to be indicated.

#### CONCLUSIONS

A disease of cattle in Louisiana, characterized by fever, severe anemia, icterus, profound depression and disturbance of digestive functions as clinical symptoms, and by the appearance of "marginal points" in the blood-smear, has been proven experimentally to be identical with the disease anaplasmosis reported from other parts of the world.

This disease occurs in a pure form, *i. e.*, unassociated with piroplasmosis, and in the absence of the tick, *Boöphilus annulatus*, which is the recognized carrier of piroplasmosis in the United States.

This disease, occurring in a pure form in Louisiana, is identical with the disease occurring in Texas in association with piroplasmosis.

The disease is inoculable from animal to animal by blood inoculation.

An animal once recovered from the disease is relatively immune to a second inoculation.

An animal once recovered from the disease remains a carrier for at least three years.

The blood of a bovine suffering from anaplasmosis can be injected into a sheep without producing any visible effect. The blood withdrawn from such a sheep, thirty days after inoculation, and injected into a susceptible bovine does produce anaplasmosis.

The disease cannot be transmitted to either rabbits or guinea pigs by blood inoculation even after these animals have been splenectomized.

*Boöphilus annulatus* engorged on anaplasmosis carriers can transmit the disease to susceptible animals in the next generation.

The larvae or seed ticks of *Amblyomma americanum*, the progeny of adults engorged on animals suffering from anaplasmosis, did not transmit the disease in the next generation.

The etiological agent of anaplasmosis is not a filtrable virus as judged by the filtration methods thus far employed.

*Anaplasma marginale*, while commonly found as definitely rounded, deeply staining granules, does exhibit other forms and these forms must be considered when these "points" are studied from the viewpoint of morphology.

*Anaplasma marginale* appears to show dividing forms when it is cultured in defibrinated or citrated blood to which a small amount of glucose has been added.

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### Two More States Added to Honor Roll

On July 1, two more states, New Hampshire and Utah, were designated officially as modified accredited areas by the U. S. Department of Agriculture, bringing the total number of accredited states up to eleven. New Hampshire is the second New England state to achieve this distinction—Maine was the first—and Utah is the third western state, preceded by Idaho and Nevada. The list reads as follows:

- |                   |                   |
|-------------------|-------------------|
| 1. North Carolina | 7. Idaho          |
| 2. Maine          | 8. North Dakota   |
| 3. Michigan       | 9. Nevada         |
| 4. Indiana        | 10. New Hampshire |
| 5. Wisconsin      | 11. Utah          |
| 6. Ohio           |                   |

### Inefficient Buffalo

A modern efficiency expert was sent to Colorado to advise the miners. An old-timer, driving with the expert on a cold day, spread a buffalo robe over their knees.

Said the efficiency expert: "You ought to turn the hair on the inside. Don't you know it's a great deal warmer to have the hair next to your body?"

The old miner obeyed and then sat there chuckling.

"What are you laughing at?"

Said the miner: "Oh, I was just thinking about that buffalo. What a fool he was all his life, not to know a simple thing like that."



## THE MASSACHUSETTS PLAN FOR THE ERADICATION AND CONTROL OF INFECTIOUS LARYNGOTRACHEITIS\*

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Infectious laryngotracheitis is a comparatively new disease. Whether it has been introduced into the United States recently or whether the intensive poultry practice of today is conducive to the enhancement of a virus which always has been present, is unknown. It is not so important to know how the disease originated as it is to realize that it is here and, unless something is done, it is here to stay as the worst enemy of the poultry industry.

Infectious laryngotracheitis presents a real challenge to the veterinary profession, for the average poultryman seems to be helpless before it. The veterinarian is the logical person to whom the poultryman should turn for help and guidance in the treatment and control of this disease.

Field and laboratory tests have demonstrated that infectious laryngotracheitis does not readily yield to ordinary medical treatment. The very nature of the disease makes it difficult to treat with drugs, and the small value of the fowl prohibits the use of expensive medicines and individual attention. As yet no drug has been found specific for infectious laryngotracheitis, and if any medical treatment is suggested by the attending veterinarian, he should make it clear that the treatment is symptomatological and not a cure. In practice, the medical treatment of infectious laryngotracheitis should not be encouraged unless the birds are especially valuable for breeding purposes, and the poultryman understands and appreciates the dangers of chronic carriers which are likely to be present in the flock after all outward symptoms of the disease have disappeared.

Medical treatments should not be recommended for commercial flocks, for the margin of profit on flocks kept for production is narrow, even when the birds are in the best of health, and it is almost impossible to make such flocks pay when affected by a disease like infectious laryngotracheitis. This is especially true in the northern states, where the disease is most likely to

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appear in the late fall or early winter, when the price for eggs is the highest of the year.

The fact that infectious laryngotracheitis tends to recur every time susceptible birds are added to a flock in which carriers of the virus exist has opened the eyes of veterinarians and enterprising poultrymen to practical methods of control based on fundamental scientific facts. These facts have been organized into a plan for the sanitary control of the disease.<sup>1</sup> The essential points of this plan are the eradication of carriers from the premises, the destruction of the virus in the houses, on the equipment and grounds occupied by the flock in which the carriers are suspected, and the prevention of the reintroduction of the virus into clean flocks. The plan as used by some breeders in Massachusetts is as follows:

1. All birds on the premises having had infectious laryngotracheitis or having been exposed to it should be condemned and disposed of at the end of the hatching season or any other time most convenient to the owner and the expedient eradication of the disease.

2. Incubators and brooders should be cleaned, disinfected, and isolated some distance from the condemned birds.

3. Chicks not having been exposed to infectious laryngotracheitis may be kept for restocking, provided they are entirely separate from the condemned birds and the premises occupied by them.

4. All buildings occupied by the condemned birds should be thoroughly cleaned and disinfected as soon after vacating as possible.

5. The houses and yards, after being cleaned and disinfected, should be opened to the air and sunshine and left vacant for two months or longer.

6. Overalls and shoes worn around the condemned birds or on the premises occupied by them should not be used in the houses, on the range, when handling feed, or when caring for chicks for restocking, unless laundered or thoroughly disinfected.

7. Utensils and equipment used around the condemned birds, or in cleaning and disinfecting the premises occupied by them, should not be used in the houses or on the range where the chicks for restocking are kept, unless said utensils and equipment have been cleaned and disinfected thoroughly.

8. United States Department of Agriculture permitted disinfectants should be used as directed for disinfecting all poultry-houses, utensils and equipment.

9. New stock should be introduced from absolutely clean flocks, or from the poultrymen's own hatchings which have been adequately protected from infection.

10. The subsequent reintroduction of infectious laryngotracheitis should be carefully guarded against.

As has been stated before, the Massachusetts Plan represents the combined results obtained by veterinarians working in the field and in laboratories and by practical poultrymen on their farms. Some results of the plan in operation are shown in table I.

TABLE I—*Field data on the Massachusetts plan for the eradication and control of infectious laryngotracheitis in farm flocks.*

FLOCKS	WHOLE PLAN		MODIFIED PLAN	
	SUCCEEDED	FAILED	SUCCEEDED	FAILED
27	21	0	2	4

A study of table I will show that 27 poultrymen are known to have tried the Massachusetts plan, or some modification of it, for the eradication and control of infectious laryngotracheitis. Twenty-one followed the plan very much as outlined and succeeded in eradicating the disease completely. Six attempted to make rather drastic modifications. Two of them succeeded and four failed. The failures were due either to improper cleaning and disinfection or insufficient airing and sunning of the houses.

Next to the disposition of carriers, the cleaning, disinfection, airing and sunning of the houses occupied by the flocks in which the carriers are suspected is most important, for it has been found that the virus will maintain its virulence for some time in dry, dusty places where there are plenty of aerobic bacteria and fungi. The dust absorbs the moisture and tends to desiccate the secretions containing the virus, while the bacteria and fungi utilize the oxygen of the air so that the virus is preserved somewhat the same as under laboratory conditions.<sup>2</sup>

After the Massachusetts plan has been faithfully carried out and clean birds are placed in the cleaned houses there is always danger of reinfection. But if the veterinarian has succeeded in getting across the cardinal ideas of sanitation, as applied to infectious laryngotracheitis, and the poultryman is capable

of understanding and putting them into practical use, this danger is negligible.

#### SUMMARY

A plan is presented for the eradication and control of infectious laryngotracheitis. The essential points of the Massachusetts plan are the eradication of the acute cases and chronic carriers from the premises, the destruction of the virus in the houses and yards occupied by the flocks in which the carriers are suspected, and the prevention of the reintroduction of the virus into clean flocks.

#### ACKNOWLEDGMENT

The writer extends his sincere thanks to Professor John C. Graham, Head of the Poultry Department, Massachusetts State College, for the use of a questionnaire and for help in reaching poultrymen interested in the eradication and control of infectious laryngotracheitis by sanitary methods.

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### Travel and Transport Building at Chicago Fair

Larger than the dome of the Washington capitol, the "sky-hung" dome of the Travel and Transport Building strikes a new note in architecture at Chicago's 1933 Century of Progress exposition. The roof is formed of metal plates suspended by steel cables hung from a circle of twelve steel towers and anchored by huge slabs of concrete. It is the first application to architecture, on any significant scale, of the principle of the suspension bridge. The dome is 125 feet high and 200 feet across, without a single arch, pillar, beam or other support to break its expanse. It is said to be the largest unobstructed area to be enclosed beneath a roof. Expansion joints permit the plates which form the roof to slide over each other, as changes in temperature, wind velocity, rain or snow load cause differences of as much as six feet in the circumference.

Eighty-five per cent of the income in Iowa is derived from live stock and we certainly need an efficient veterinary service to protect this industry in our state—MARK G. THORNBURG, *Former Secretary, Iowa Department of Agriculture.*

## CECAL OCCLUSION IN THE PREVENTION OF BLACKHEAD (ENTEROHEPATITIS) IN TURKEYS\*

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Enterohepatitis has made breeding of turkeys unprofitable, if not impossible, in many regions of this country. Numerous therapeutic and preventive measures have been tried in an attempt to cure or prevent the disease. Medicinal agents have proved of little value. Probably the greatest advances in the practical aspects of the problem were made when Curtice,<sup>1</sup> Graybill and Smith,<sup>2</sup> and Tyzzer<sup>3</sup> discovered and worked out the relation of chickens in the propagation and dissemination of the disease, and the development of Billings' plan of rearing the poults on limited range with frequent changes on ground uncontaminated by chickens. However, even under the system of limited ranges, blackhead has developed in turkeys on ground over which chickens have not ranged for years. Another solution of the problem must be sought for farmers who desire to raise both chickens and turkeys, or for farmers residing in the older settled regions where most of the land may have been contaminated by chickens.

A striking departure in prophylaxis was announced by Durant,<sup>4</sup> in 1929. He conceived the idea of ligating the cecums of poults, and thus preventing the organisms from gaining entrance to the body as they normally do. He ligated the cecums of 34 poults, and then exposed them to infected ground, with 42 normal poults as controls. Thirty-nine of the control birds died, whereas all of the poults with completely ligated cecums remained healthy. Six poults, in which one cecum was not separated completely from the main intestine, contracted enterohepatitis. In each instance the lesions were found in the cecum that was still patent and functioning. The results of Durant's experiments indicated that the operation of cecal abligation did prevent the occurrence of enterohepatitis. However, since the mortality owing to the operation was very great (about 50 per cent in poults two to four months of age), it readily can be seen from a practical standpoint that this method could not be adopted generally.

We undertook an investigation of the problem to determine the following facts: (1) If Durant's results in preventing the dis-

\*Read before the Minnesota State Veterinary Medical Society, Minneapolis, Minn., January 12-13, 1933.

ease by occlusion of the cecums could be repeated; (2) if a practical technic for occluding the cecums could be developed; (3) if the physiologic removal of the cecums affected the growth and development of the turkey, and (4) if turkeys from which the cecums had been removed physiologically could produce eggs of normal fertility, hatchability and viability. Our investigations have given positive answers to the first two questions, some suggestive data in regard to the third question, and the fourth problem is under consideration.

In order to determine if cecal occlusion would prevent the development of blackhead, it was necessary to make an experimental setup which would insure access of the causative organism to all of the birds on which operation had been performed. It therefore was thought best to expose these birds to natural conditions of a mass infection of such a degree that all the control birds with intact cecums would succumb to the disease. As will be described later, this condition was met.

All the poults used in this investigation were hatched in an electric incubator and battery brooded. They were taken from the battery brooder to the operating-room for operation, and after recovery were replaced in the battery brooder with the control poults on which operation had not been done.

All operations were performed under ether anesthesia, which has been found satisfactory for poults. At first the proximal centimeter of each cecum was resected and the cut ends were ligated. However, the mortality from peritonitis was so high after this procedure that the method was abandoned. The technic finally evolved, and which proved satisfactory, was as follows: A diagonal incision, about 3 cm long, parallel to the left pubic bone, was made through the left wall of the abdomen. This incision was what would be called a left semilunar incision in the mammal, and was so situated that very little muscle was cut, since the abdominal wall in this region is composed mainly of fascia. Care must be taken not to cut too far cephalically and enter the air sacs. Through the incision the rectum and rectocecal junctures can be seen lying on the left kidney in the left upper quadrant. A small aneurysm needle is slipped gently through the mesentery under the cecums near their proximal terminations and these structures are pulled up into the abdominal wound (fig. 1). A small hemostat is now placed across both cecums, the lower blade passing through the rent in the mesentery made by the aneurysm needle, and the proximal portion of these structures gently but completely crushed. Silk ligatures (number 0) are threaded in an aneurysm needle and placed above and below the



crushing clamp. These ligatures were securely tied before the clamp was removed. When this procedure is carried out properly, the mucosa of the cecums is not exposed. The crushing of the structures, with double ligature, prevents the cecums from again becoming patent, as almost invariably occurs in all cases in which the intestine is occluded with a single ligature.

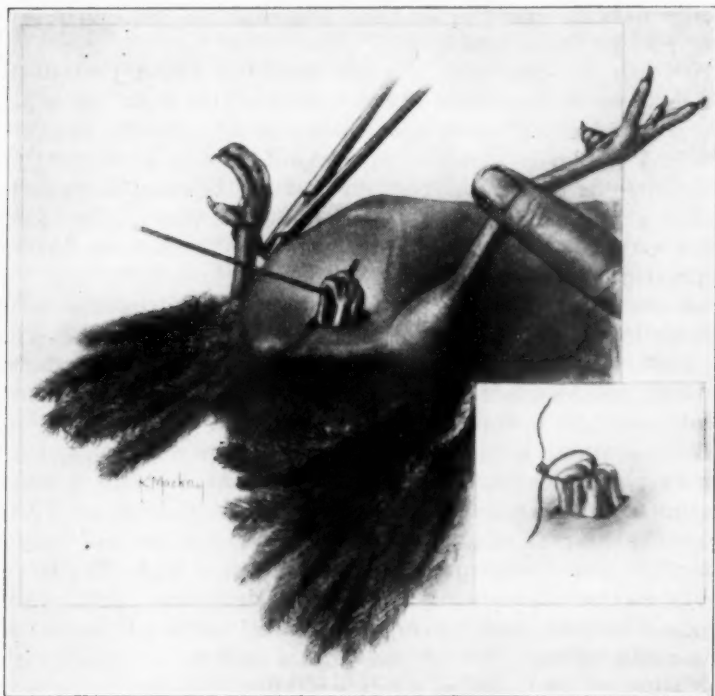


FIG. 1. Technic used in cecal ligation.

This procedure can be carried out in about three to four minutes for each poult. No deaths occurred when this method was employed, although it was used on 35 birds. Restoration of patency of the lumen of the cecums has not been observed.

We have learned a few points of specific importance in operating on turkeys. We were surprised to find how susceptible the turkey is to infection from contamination from the cecums. Simple section of these structures with careful ligation of the cut ends often was followed by peritonitis that resulted fatally. Peritonitis was a potential outcome in every instance in which the lumen of the cecum was entered. We were surprised also to dis-

cover that entering the air sacs and the resulting subcutaneous emphysema was so serious in the turkey. This accident occurs so frequently when caponizing chickens and is of so little significance that we were not prepared for the serious consequences that its occurrence produced in the young turkey. None of our poults in which subcutaneous emphysema occurred survived. In some instances the air was removed frequently and the poults lived as long as six weeks after operation, but the recurrence of the emphysema did not cease and the outcome was fatal.

We have operated on poults from two to twelve weeks of age. The operation appeared to be the easiest to perform when the poults were about four weeks of age. It was found best to fast the birds 16 to 18 hours before operation, but water was allowed. Application of artificial heat aided in quick recovery from the anesthetic and operation.

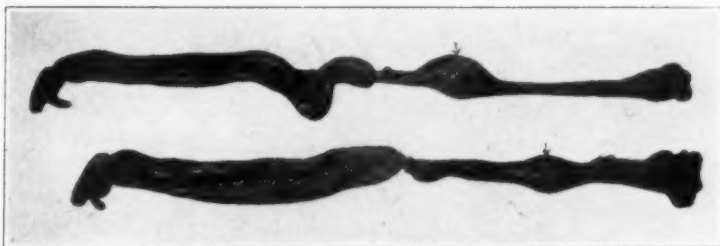


FIG. 2. Cecums and rectums of operated birds that died of blackhead. The cecal lesion is indicated by arrow.

The following is a brief presentation of the investigation dealing with the effect of cecal occlusions on infection from blackhead. During the second and third weeks of June, 1932, a group of poults which had been hatched May 17 were operated on. In all of these birds a portion of the cecums measuring from 0.5 to 1 cm was resected and the cut ends were ligated. The birds operated on were kept in battery brooders with the control birds from the same hatch for three to four weeks after operation.

To insure a constant exposure of the birds to blackhead, a site was prepared as follows: chickens were removed from a poultry-house in which chickens had been kept continuously for the preceding four years. The poultry-house was 20 feet square, with a 10-foot sun porch on the south side. It was of excellent construction but had a gravel floor. The dropping-boards were cleaned thoroughly and the litter was removed from the floor. The roosts and walls were sprayed thoroughly to kill any vermin

present. The floor was spaded, exposing the black soil below the gravel. The feed for the turkeys was placed in the mash-feeders previously used for the chickens.

July 14, twenty-two poults that had been operated on and twelve on which operation had not been done, from the same hatch, were placed in the poultry-house described. That none of these birds carried the organism of blackhead previous to exposure in this

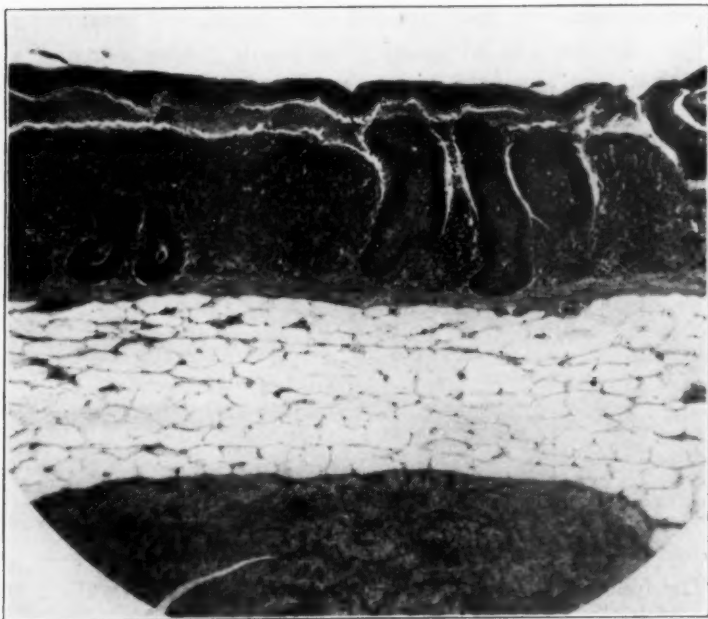


FIG. 3. Transverse section of wall of unoccluded cecum ( $\times 100$ ).

experiment is evidenced by the fact that in none of our flock of 132 control birds, composed of birds taken from this hatch as well as from all the other hatches for the year and reared on uncontaminated range, did blackhead develop. All the birds used in this investigation appeared to be in excellent condition at the time they were removed from the battery brooders. On July 20, fifteen Leghorn cockerels, aged 16 weeks, were placed with them. The poults grew and remained in good condition until July 27, when three of the birds not operated on appeared sick and shortly afterward died of blackhead. The control birds continued to die of blackhead, until all had succumbed, the last ones dying August 6. None of the birds on which operation had been

done showed symptoms of blackhead until August 11. From this date until October 2, seven of these died of blackhead (table I). The remaining birds grew to maturity. On August 20, the birds were permitted free range over ground that had been fertilized with chicken droppings, but were fed and sheltered in the chicken-house with Leghorn cockerels until October 20.

In evaluating the results of this experiment, it should be emphasized that special precautions were taken to insure exposure of all birds to the infecting organism. The turkeys were always on ground contaminated by chickens or fertilized with

TABLE I—Cecal occlusion experiment.

DATE (1932)	CONTROLS (NORMAL)			OPERATED ON (CECAL OCCLUSION)		
	DIED		ALIVE	DIED		ALIVE
	No.	EXPOSURE (DAYS)		No.	EXPOSURE (DAYS)	
7-14			12			22
7-27	1	13	11			22
7-30	2	16	9			22
8-2	1	19	8			22
8-3	2	20	6			22
8-5	2	22	4			22
8-6	4	23	0			22 well
8-12				2	29	20
8-14				2	31	18
8-24				1	41	17
9-12				1	62	16
10-2				1	82	15
11-21						15 well

*Note:* The first control bird died of blackhead 13 days after exposure, and all of the control birds were dead 23 days after exposure, whereas the first bird operated on died on the 29th day of exposure.

chicken droppings. Three years previously a chicken which ranged on this ground died of blackhead. The turkeys fed and roosted in close confinement with cockerels for several weeks. The surviving birds which had been operated on were kept for 130 days in an environment in which all the birds which had not been operated on contracted blackhead and died in 23 days. All of the control birds died of blackhead before any of the birds operated on had become sick. One hundred per cent of the control birds died of blackhead, whereas less than a third of the birds operated on died of the disease.

These results definitely prove that a turkey with occluded cecums may die of blackhead, but that a high percentage of birds

so operated on will survive in an environment in which all normal birds will succumb to the disease. It would seem probable that all turkeys with occluded cecums would survive in an environment in which only part of the normal birds contracted blackhead. We plan to put this hypothesis to a test next year.

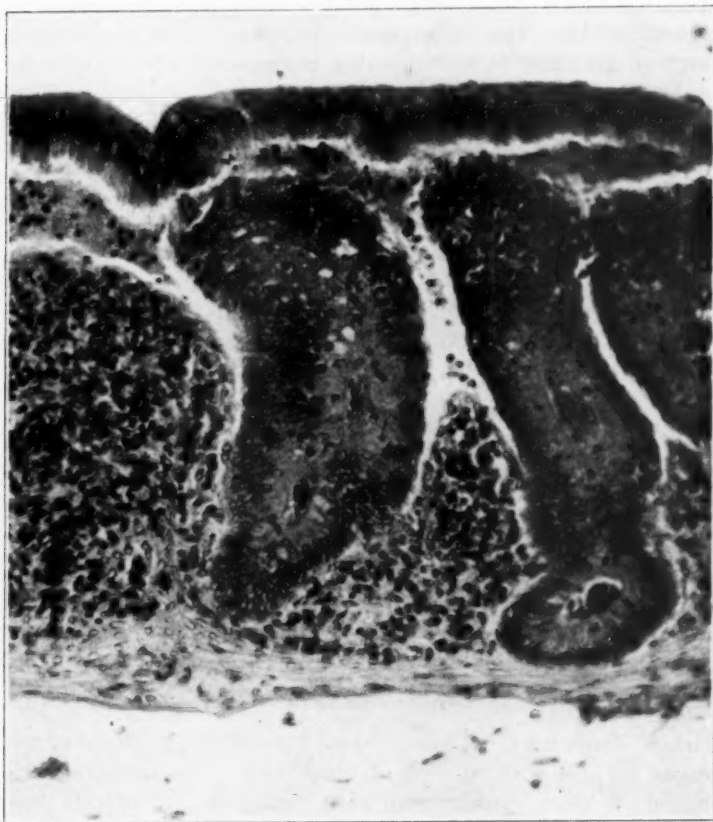


FIG. 4. Transverse section of wall of unoccluded cecum (x 285).

The mode of infection of the birds with cecal occlusion was of special interest. In most instances the disease developed slowly in the birds operated on and they were sick several days before death. At necropsy the intestinal lesion, and in all probability the primary lesion of the disease, was found in the rectum (fig. 2). These rectal lesions were situated about 2 cm caudal to the rectocecal juncture, and in no instance were the short

remaining portions of the cecums involved. Grossly, the rectal lesions were similar to the lesions found in the cecums of the control birds. The hepatic lesions usually appeared to be older in the birds operated on that died of blackhead than in the control birds.

The condition of the occluded cecums of the mature birds showed some points of interest. The occluded cecums developed but did not reach normal size. They were filled with a gray, putty-like material. They were less vascular and the walls were

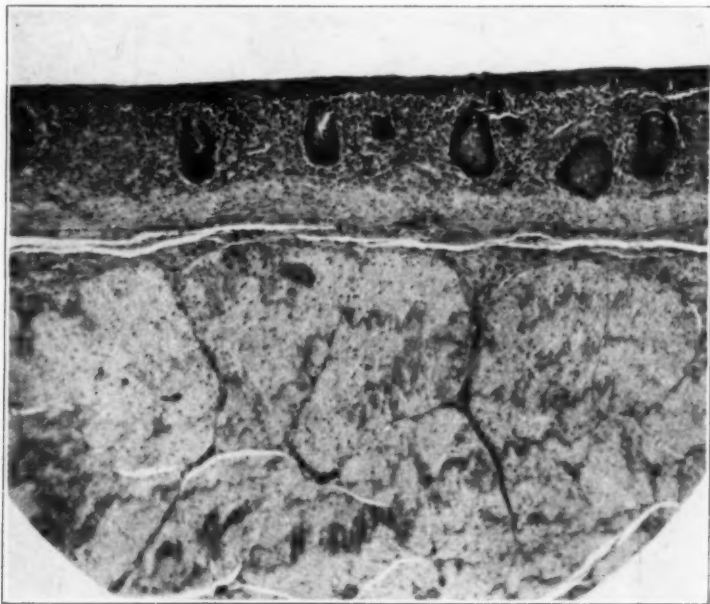


FIG. 5. Transverse section of wall of occluded cecum (x 100).

thinner than normal. The surface of the mucosa was smooth and thin as compared with the normal mucosa. Histologic examination showed that the muscularis of an occluded cecum was almost normal in appearance, but the mucosa was atrophic and contained few normal-appearing mucosal cells (figs. 3, 4, 5 and 6). It is of interest also to note that the rectums of the birds with the occluded cecums enlarged somewhat in the same manner as the rectum of a dog will dilate when the major portion of the colon is removed.

This investigation definitely solved our first two problems, namely, the cecums of the turkey can be occluded in a satisfactory



and practical manner and Durant's results are confirmed, that is, occlusion of the cecums does protect against the infection of blackhead. The third problem, whether poults with physiologically removed cecums would grow and develop normally, was investigated in the following experiment. It is obvious that in order to obtain an answer to this problem it would be necessary

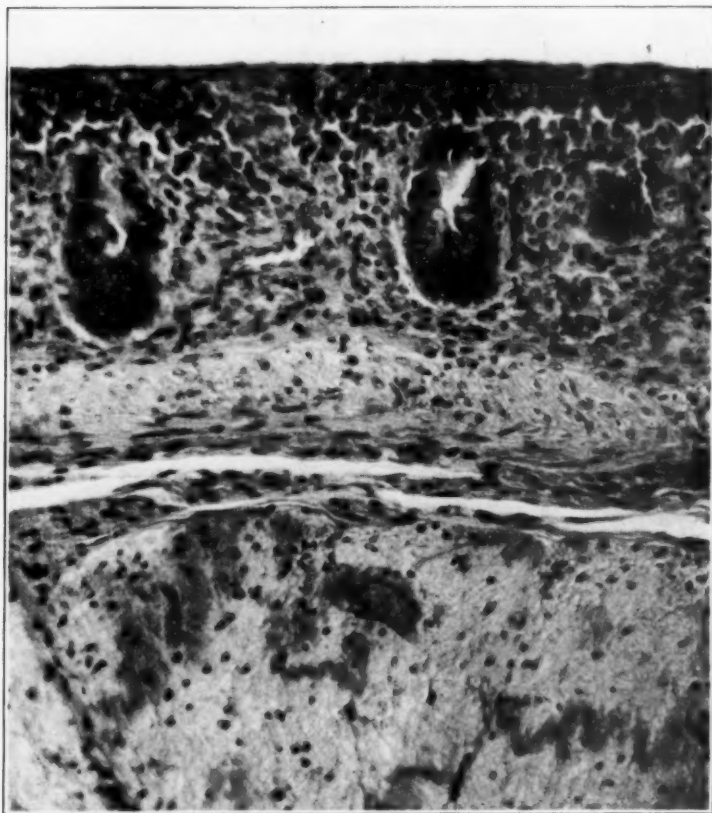


FIG. 6. Transverse section of wall of occluded cecum ( $\times 285$ ).

to raise the birds under conditions in which the controls, not operated on, would not be exposed to blackhead.

On August 3, 1932, three birds in which the cecums had been occluded July 27 and three poults not operated on, from the same hatch, were placed in an isolated building in which neither chickens nor turkeys had been kept previously. All six poults were hatched June 25, and were of almost equal weight. They were

given access to a small yard with a gravel floor. The birds were given the usual ration and care. The weights of the individual birds were determined every 14 to 20 days. As the poults were hatched late and kept closely confined, they did not make so rapid growth as those hatched early on range usually do. However, as the conditions for both the birds operated on and those not operated on were similar, it appeared to be a fair test to determine if the birds operated on would grow and develop the same as those not operated on. It was found that there was no difference in the rate of growth and development of the two groups of birds. There was no apparent difference in the birds operated on and control birds during life or after being dressed for meat. As a matter of fact, none of our birds operated on has failed to make apparently normal growth. These observations would indicate that the physiologic removal of the cecums does not affect the rate of growth and development of the poults. However, before an unqualified answer to this question can be given, it will be necessary to raise a large series of birds operated on, and control birds, on range and under conditions in which the growth can be forced, as is done in raising turkeys for market.

Several of our birds operated on have been killed and dressed for meat. Adhesions rarely were found at the site of operation. The birds were fat and the meat of normal flavor and tenderness.

Whether occlusion of the cecums of turkeys will prove to be of any practical value remains to be demonstrated. It is obvious that it will not be of value to the breeder who raises a large number of birds and has ample range uncontaminated with the infecting organism. It is possible, however, that the procedure may prove of practical value to the farmer who raises chickens and wishes to raise a few turkeys on ground which is too badly contaminated for the rearing of birds without operation. It may be feasible to work out a plan whereby the farmer can obtain poults which have been hatched in a local hatchery, battery brooded for a few weeks, and operated on by a veterinarian. Such poults might be raised successfully and profitably near his home on ground contaminated to such an extent that the losses of normal birds from blackhead would be too great for profit. It is possible also that the operation may be of value when performed on birds designed for breeders, and thus prevent the occasional outbreaks of blackhead which are so disastrous when they occur in the adult breeding flock. However, knowledge of the functional significance of the cecums is still too incomplete to postulate that their loss may not prove harmful at some stage of the life of the bird.

A point of general interest to those in the field of experimental medicine brought out by the experiments of Durant and corroborated by our investigation is the fact that protection against a disease may be obtained by closing the usual portal of entry for the disease.

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### Going Abroad via the World's Fair

Paris is coming to Chicago for the World's Fair. Famous French restaurants will be reproduced in the section to be known as the Streets of Paris. Models of the Café de la Paix and the Café de Paris will overlook the promenade and Lake Michigan, and several small cafés with bars and sidewalk and terrace tables will supplement them. Wine, beer, sandwiches, and your favorite cheese, whether it be Roquefort, de Brie, Camembert, or another variety, will be served. At the sidewalk cafes you may sit in pleasant relaxation and watch the crowds go by.

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### Rents Floor of Hotel for Dog

An Idaho sheep-raiser and his four-month old dog came to Chicago recently and registered at a loop hotel. The hotel manager protested when he found the dog roaming the corridors. He said the guests wouldn't like it. The gentleman from Idaho, indignant, promptly rented the entire floor for \$53 per day, so his dog could enjoy himself.

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### Chicagoland Week

Chicago is promising its visitors a thrilling seven days from August 13 to 19, when the Windy City makes its contribution to A Century of Progress. Chicagoland Week will be replete with thrilling spectacles, including pageants, tableaux, water events and many other forms of unusual entertainment. Farmers' Week is scheduled for the same dates.

## NEOPLASMS ENCOUNTERED IN FEDERALLY INSPECTED ESTABLISHMENTS IN DENVER, COLORADO\*

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The subject of neoplasms in animals is by no means new, yet a comprehensive study of tumors as they occur in animals was wanting in the English language until the publication of Feldman's "Neoplasms of Domesticated Animals." In veterinary practice very few records are available on the prevalence of neoplasms in animals, as only occasional necropsies are performed on animals following death. The establishments where animals are slaughtered for food afford the best means of obtaining such records, since many thousands of animals go through these establishments annually.

### SCOPE OF STUDY

For the last five years, the writers have made a study of tumors of food-producing animals slaughtered at Denver under federal inspection. During this period a series of 150 tumors, retained from cattle, sheep and hogs, was selected for study. A record was made of each animal affected with a tumorous condition, by noting the species, age, breed, organ or tissue affected, metastasis, etc. The number of tumors in this series represents only a small percentage of the neoplasms encountered at the Denver station during the five years. The series includes only those tumors sent to the laboratory for histologic examination. In the majority of cases, the postmortem diagnosis was confirmed by the laboratory. All the material contained in this series was sent to Dr. W. H. Feldman, Institute of Experimental Medicine, Mayo Clinic, Rochester, Minn., for his information and use in compiling data for his monograph.

### PURPOSE OF PAPER

Realizing the fallacy of attempting to make an accurate macroscopic diagnosis of every retained tumor, it is hoped, that by presenting a tabulated report of a series of 150 tumors found on postmortem inspection, giving the location, organs or tissues involved, and a histologic diagnosis for each, it may be of some assistance to veterinarians engaged in meat inspection work in diagnosing tumors likely to be encountered in food-producing

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\*Received for publication, February 13, 1933.

TABLE I—*Neoplasms in cattle.*

SPEC- IMEN	BREED	AGE	ORGAN OR TISSUE AFFECTED	HISTOLOGIC DIAGNOSIS
1	Shorthorn	7 yrs.	Adrenal	Carcinoma
2	Hereford	8 yrs.	Adrenal	Carcinoma
3	Hereford	4 yrs.	Eye, parotid lymph-gland	Carcinoma
4	Mixed	6 yrs.	Adrenal	Carcinoma
5	Hereford	4 yrs.	Pericardium, heart	Endothelioma
6	Hereford	6 yrs.	Eye, parotid, lungs, pleura	Carcinoma
7	Hereford	4 yrs.	Uterus, iliacs, sublumbar	Carcinoma
8	Mixed	Aged*	Ovary	Hypernephroma
9	Hereford	Aged	Eye, lungs, mediastinal	Carcinoma
10	Hereford	Aged	Eye, lungs, parotid	Carcinoma
11	Shorthorn	5 yrs.	Adrenal	Carcinoma
12	Mixed	Aged	Adrenal	Carcinoma
13	Mixed	8 yrs.	Lungs, iliacs, sublumbar	Hemangio- endothelioma
14	Mixed	Aged	Uterus, bronchial, mediastinal	Carcinoma
15	Mixed	Aged	Pleura, peritoneum, all body glands	Myeloma (malignant)
16	Mixed	Aged	Iliacs, sublumbar	Carcinoma
17	Mixed	6 yrs.	Neck, atlantal lymph-glands	Fibrosarcoma
18	Hereford	4 yrs.	Adrenal	Neuroblastoma (malignant)
19	Hereford	6 yrs.	Adrenal	Adenoma
20	Mixed	Aged	Adrenal	Carcinoma
21	Mixed	7 yrs.	Adrenal	Adenoma
22	Mixed	7 yrs.	Adrenal	Carcinoma
23	Hereford	5 yrs.	Adrenal	Adenoma
24	Hereford	4 yrs.	Liver	Carcinoma (primary)
25	Mixed	7 yrs.	Adrenal	Carcinoma
26	Mixed	7 yrs.	Heart (metastatic)	Lymphocytoma†
27	Holstein	Aged	Eye, parotid, retropharyngeal	Carcinoma
28	Mixed	8 yrs.	Brisket	Fibroma
29	Mixed	8 yrs.	Liver	Carcinoma (primary)
30	Hereford	7 yrs.	Adrenal	Neuroblastoma
31	Hereford	6 yrs.	Eye, cervicals, lungs	Carcinoma
32	Hereford	6 yrs.	Gall-bladder	Papillary adeno- carcinoma
33	Hereford	8 yrs.	Skin, submaxillary	Carcinoma
34	Mixed	Aged	Uterus, lungs, bronchial, mediastinal	Leiomyosarcoma
35	Mixed	Aged	Liver	Carcinoma (primary)
36	Hereford	Aged	Adrenal	Carcinoma
37	Jersey	Aged	Shoulder, lungs, prescapular	Osteosarcoma
38	Mixed	6 yrs.	Skin, supramammary	Carcinoma
39	Mixed	Aged	Cervical, lungs, bronchial, mediastinal	Carcinoma
40	Mixed	Aged	Liver	Hematoma (multiple)

\*Over ten years old.

†Feldman's designation of the malignant form of lymphoblastoma.

TABLE I—Neoplasms in cattle—Continued.

SPEC- IMEN	BREED	AGE	ORGAN OR TISSUE AFFECTED	HISTOLOGIC DIAGNOSIS
41	Hereford	7 yrs.	Uterus, lungs, kidney, peritoneum	Carcinoma
42	Hereford	6 yrs.	Cervical, lungs, bronchial, mediastinal	Carcinoma
43	Hereford	Aged	Parotid, atlantals	Carcinoma
44	Mixed	6 yrs.	Kidney, lungs, renal	Embryonal nephroma
45	Hereford	7 yrs.	Pleura, pericardium	Mesothelioma
46	Mixed	Aged	Pancreas	Fibrosarcoma
47	Mixed	6 yrs.	Ovary	Carcinoma
48	Hereford	10 yrs.	Neck, prescapular, abdominal wall	Myeloblastic sarcoma (chloroma)
49	Jersey	2 yrs.	Penis	Fibroma (hard)
50	Hereford	2 yrs.	Head	Keloid
51	Holstein	Aged	Mammae	Keloid
52	Mixed	Aged	Uterus, lung, bronchial, liver	Leiomyosarcoma
53	Hereford	4 yrs.	Ovary	Carcinoma
54	Hereford	7 yrs.	Ovary, peritoneum, mediastinal	Carcinoma
55	Holstein	6 yrs.	Uterus, iliacs, lungs, bronchial	Adenocarcinoma
56	Holstein	Aged	Liver	Hepatoma (malignant)
57	Hereford	6 mos.	Liver, all body glands	Lymphocytoma
58	Holstein	10 yrs.	Heart, diaphragm duodenum	Lymphocytoma
59	Hereford	8 yrs.	Lungs, bronchial, mediastinal, iliacs	Adenocarcinoma
60	Shorthorn	7 yrs.	Back	Carcinoma
61	Shorthorn	10 yrs.	Liver	Adenoma
62	Mixed	8 yrs.	Ovary	Adenocarcinoma
63	Hereford	3 yrs.	Sheath	Melanoma
64	Hereford	10 yrs.	Rumen	Fibroma (multiple)
65	Mixed	8 yrs.	Masseter muscle	Hemangio-endo- thelioma
66	Mixed	8 yrs.	Bronchial, lymph-gland	Fibrosarcoma
67	Hereford	4 yrs.	Brachial plexus	Neurofibroma
68	Hereford	Aged	Vulva	Carcinoma
69	Holstein	10 yrs.	Liver	Cystadenoma
70	Hereford	4 yrs.	Lower cervicals	Myeloblastic sarcoma
71	Mixed	4 yrs.	Gall-bladder	Adenocarcinoma
72	Mixed	6 yrs.	Frontal sinus	Fibroma
73	Hereford	10 yrs.	Lower cervicals	Lymphocytoma
74	Mixed	8 yrs.	Uterus, lungs, kidneys, heart, diaphragm, mesentery	Lymphocytoma
75	Hereford	Aged	Eye, parotid, lungs, mediastinal	Carcinoma
76	Hereford	9 yrs.	Lungs, bronchial, portal, renal, iliacs	Carcinoma
77	Mixed	Aged	Peritoneum, omentum	Lipoma (multiple)
78	Mixed	7 yrs.	Liver	Carcinoma (primary)



TABLE I—*Neoplasms in cattle—Concluded.*

SPEC- IMEN	BREED	AGE	ORGAN OR TISSUE AFFECTED	HISTOLOGIC DIAGNOSIS
79	Shorthorn	6 mos.	Skin (foreleg)	Melanoma
80	Shorthorn	3 yrs.	Atlantals, retropharyngeal	Carcinoma
81	Holstein	6 yrs.	All body lymph-glands	Lymphocytoma
82	Hereford	4 yrs.	Ovary	Carcinoma
83	Mixed	6 yrs.	Adrenal	Adenoma
84	Hereford	4 yrs.	Urinary bladder	Cystadenoma
85	Mixed	6 yrs.	Pleura (multiple)	Endothelioma
86	Mixed	7 yrs.	Iliacs, sublumbars	Lymphocytoma
87	Holstein	Aged	Uterus (metastatic)	Carcinoma
88	Hereford	2 yrs.	Frontal sinus	Myxosarcoma
89	Hereford	Aged	Eye	Carcinoma
90	Hereford	6 yrs.	Eye, lungs, bronchial, mediastinal	Carcinoma

TABLE II—*Summary of neoplasms in cattle.*

TUMOR			ORGAN OR TISSUE AFFECTED AND NUMBER OF CASES EACH
KIND	No.	%	
Adenocarcinoma.....	5	5.6	Gall-bladder, 2; ovary, 1; generalized, 2
Carcinoma.....	40	44.4	Adrenal, 9; eye, 9; uterus, 4; liver, 4; ovary, 4; skin, 4; vulva, 1; general- ized, 3; lymph-glands, 2
Fibrosarcoma.....	3	3.3	Neck, 1; pancreas, 1; bronchial lymph- gland, 1
Leiomyosarcoma....	2	2.2	Uterus, 2
Myeloblastic sarcoma (chloroma).....	2	2.2	Neck, 1; cervicals, 1
Osteosarcoma.....	1	1.1	Shoulder, 1
Hypernephroma.....	1	1.1	Ovary, 1
Myxosarcoma.....	1	1.1	Frontal sinus, 1
Lymphocytoma.....	7	7.8	Heart, 1; cervicals, 1; iliacs, 1; duode- num, 1; generalized, 3
Myeloma.....	1	1.1	Generalized, 1
Embryonal nephroma	1	1.1	Kidney, 1
Neuroblastoma.....	3	3.3	Adrenal, 2; brachial plexus, 1
Hepatoma.....	1	1.1	Liver, 1
Endothelioma.....	4	4.4	Pleura, 1; pericardium, 1; masseter, 1; generalized, 1
Mesothelioma.....	1	1.1	Pleura, 1
Adenoma.....	7	7.8	Liver, 2; urinary bladder, 1; adrenal, 4
Melanoma.....	2	2.2	Skin, 2
Fibroma.....	4	4.4	Rumen, 1; brisket, 1; penis, 1; frontal sinus, 1
Hematoma.....	1	1.1	Liver, 1
Lipoma.....	1	1.1	Visceral fat, 1
Keloid.....	2	2.2	Skin, 2
	90	99.7	

animals. The writers have referred to their own records in many instances as an aid in making a correct diagnosis.

#### TYPE AND DISTRIBUTION

The tables give the data for 90 tumors in cattle, 26 tumors in hogs, and 34 tumors in sheep, affecting practically all organs and tissues. Animals of varying ages and breeds showed tumorous involvement. No records of the breeds of sheep and hogs were available because the identity of these species is lost before the carcasses are presented for viscera inspection. Both malign and benign neoplasms were evident. Some of the growths remained localized while others showed widespread metastasis. Of the 90 tumors in cattle, 72 were classed as malignant and 18 as benign. Metastasis occurred in 38 of the malignant group, while 34 remained localized. Among the sheep tumors, 25 were malignant

TABLE III—*Neoplasms in swine.*

SPEC- IMEN	AGE	ORGAN OR TISSUE AFFECTED	HISTOLOGIC DIAGNOSIS
1	18 mos	Skin	Melanoma
2	1 yr.	Kidney	Embryonal nephroma*
3	10 mos.	Kidney	Embryonal nephroma
4	8 mos.	Kidney	Embryonal nephroma
5	10 mos.	Kidney	Embryonal nephroma
6	18 mos.	Kidney	Embryonal nephroma
7	4 yrs.	Kidney, renal, sublumbar	Embryonal nephroma
8	4 yrs.	Kidney	Embryonal nephroma
9	8 mos.	Kidney	Embryonal nephroma
10	1 yr.	Liver, spleen, colics	Lymphocytoma
11	1 yr.	Kidney	Embryonal nephroma
12	1 yr.	Kidney	Embryonal nephroma
13	1 yr.	Pericardium	Lymphocytoma
14	18 mos.	Kidney	Embryonal nephroma
15	1 yr.	Liver, body glands	Lymphocytoma
16	1 yr.	Kidney (bilateral)	Embryonal nephroma
17	10 mos.	Skin	Fibroma (multiple)
18	1 yr.	Adrenal	Carcinoma
19	3 yrs.	Pericardium	Fibrosarcoma
20	4 yrs.	Ovary	Cavernous hemangioma
21	1 yr.	Lung, bronchial, mediastinal, pleura	Lymphocytoma
22	3 yrs.	Kidney	Embryonal nephroma
23	9 mos.	Submaxillary, lymph- glands	Lymphocytoma
24	4 yrs.	Supramammary, iliaes	Lymphocytoma
25	8 mos.	Lungs, kidneys, renal, sublumbar	Embryonal nephroma
26	3 yrs.	Kidney	Embryonal nephroma

\*Feldman's designation of the so-called adenosarcoma of swine.

and 9 benign, and of the malignant growths, 6 showed metastasis, and 19 were localized. The 26 tumors in hogs revealed 23 malignant and 3 benign growths, with 6 of the malignant type showing metastasis and 17 remaining localized. In some of the cases the primary involvement was not determined, since in meat inspection practice, when sufficient lesions are found to require condemnation of the carcass, no further time is given to the case for detailed study, and for this reason some of the primary involvements were overlooked or impossible to ascertain. The tables show a number of cases in which the initial lesions were undetermined.

Feldman,<sup>1</sup> in his study of lymphoid tumors of animals, classifies the malignant form of primary neoplastic lymphoid hyperplasia as leukemic and aleukemic lymphocytoma, and the benign form as lymphoma. It will be noted in the tables that this form of tumor is second in frequency to the carcinoma in cattle and sheep and more prevalent than carcinoma in swine.

TABLE IV—*Summary of neoplasms in swine.*

TUMOR			ORGAN OR TISSUE AFFECTED AND NUMBER OF CASES OF EACH
KIND	No.	%	
Carcinoma.....	1	3.8	Adrenal, 1
Fibrosarcoma.....	1	3.8	Pericardium, 1
Lymphocytoma.....	6	23.1	Submaxillary, 1; iliacs, 1; pericardium, 1; generalized, 3
Embryonal nephroma	15	57.7	Kidney, 15
Cavernous hemangioma.....	1	3.8	Ovary, 1
Fibroma.....	1	3.8	Skin, 1
Melanoma.....	1	3.8	Skin, 1
	26	99.8	

From table IV it appears that the kidney in hogs is more susceptible to tumorous involvement than other organs. Day,<sup>2</sup> in 1907, was first to describe a neoplastic process affecting the kidneys of swine which he termed embryonal adenosarcoma. Feldman<sup>3</sup> made a study of the histopathology of 11 tumors from the kidneys of swine from this series and found that 7 tumors showed carcinomatous tendencies while 4 tumors showed both epithelial and connective tissue cells and for this reason prefers the use of the term embryonal nephroma rather than the usual designation of adenosarcoma. In meat inspection practice these tumors usually are referred to as adenosarcomas.

TABLE V—*Neoplasms in sheep.*

SPEC- IMEN	AGE	ORGAN OR TISSUE AFFECTED	HISTOLOGIC DIAGNOSIS
1	3 yrs.	Adrenal	Carcinoma
2	6 yrs.	Region of larynx	Lymphoma
3	5 yrs.	Shoulder	Carcinoma
4	1 yr.	Scapula	Fibrosarcoma
5	Aged*	Eye	Carcinoma
6	4 yrs.	Heart	Fibroma
7	Aged	Adrenal	Carcinoma
8	5 yrs.	Scapula	Chondroma
9	Aged	Thyroid	Carcinoma
10	Aged	Liver	Carcinoma (primary)
11	Aged	Adrenal	Carcinoma
12	Aged	Adrenal (bilateral)	Carcinoma
13	Aged	Adrenal	Carcinoma
14	4 yrs.	Lungs	Cystadenoma
15	Aged	Uterus	Leiomyosarcoma
16	Aged	Adrenal	Carcinoma
17	Aged	Adrenal	Adenoma
18	1 yr.	Shoulder (metastatic)	Adenocarcinoma
19	3 yrs.	Thymus (metastatic)	Carcinoma
20	Aged	Liver, lungs, bronchial, mediastinal	Lymphocytoma
21	Aged	Adrenal (bilateral)	Carcinoma
22	Aged	Adrenal (bilateral)	Carcinoma
23	Aged	Kidney, lungs, liver	Hemangioma (malignant)
24	Aged	Parotid, retropharyngeal, mediastinal	Lymphocytoma
25	Aged	Kidney, liver, renal, adrenal	Lymphocytoma
26	Aged	Lungs, liver, kidney	Lymphocytoma
27	4 yrs.	Adrenal (bilateral)	Carcinoma
28	4 yrs.	Uterus	Leiomyoma
29	1 yr.	Shoulder	Rhabdomyoma
30	4 yrs.	Thyroid	Adenoma
31	5 yrs.	Eye	Carcinoma
32	Aged	Liver	Carcinoma (primary)
33	Aged	Lungs, liver, bronchial	Lymphocytoma
34	Aged	Mediastinal	Lymphoma

\*Over six years old.

It will be noted in table II that only 9 cases of carcinoma were recorded as affecting the eye in cattle. This number is but a very small percentage of the eye carcinomas found in cattle at the Denver station. In our experience the eye and its appendages are the most common seats for cancerous involvement. To determine the prevalence of this disease in cattle slaughtered at the three federally inspected houses in Denver, the veterinarians conducted an investigation during the months of October, November and December, 1931, and January, 1932. The records for this period

TABLE VI—*Summary of neoplasms in sheep.*

TUMOR			ORGAN OR TISSUE AFFECTED AND NUMBER OF CASES OF EACH
KIND	No.	%	
Adenocarcinoma.....	1	2.9	Shoulder, 1
Carcinoma.....	16	47.1	Adrenal, 9; eye, 2; thyroid, 1; liver, 2; thymus, 1; shoulder, 1
Fibrosarcoma.....	1	2.9	Shoulder, 1
Leiomyosarcoma.....	1	2.9	Uterus, 1
Lymphocytoma.....	5	14.7	Generalized, 5
Hemangioma.....	1	2.9	Generalized, 1
Adenoma.....	3	8.8	Thyroid, 1; adrenal, 1; lung, 1
Lymphoma.....	2	5.9	Mediastinum, 1; region larynx, 1
Leiomyoma.....	1	2.9	Uterus, 1
Rhabdomyoma.....	1	2.9	Shoulder muscle, 1
Fibroma.....	1	2.9	Heart, 1
Chondroma.....	1	2.9	Scapula, 1
	34	99.7	

showed 213 cattle retained for carcinoma of the eye from 32,499 slaughtered (0.65 per cent). Of this number, 40 showed metastasis to other parts of the carcass. Among the 213 eye carcinomas, 203 cases (95.3 per cent) were found in the Hereford breed and 10 cases (4.7 per cent) were in other breeds. A similar investigation was conducted in 1929 by Dr. Frank Jelen, inspector-in-charge of meat inspection at South Omaha. He reported carcinoma of the eye in 324 cattle out of 75,241 inspected (0.43 per cent). Of the 324 cases, 309 (95.3 per cent) were Herefords and 15 (4.7 per cent) were other breeds. It is interesting to note the similarity of the findings in the two investigations.

Table IV shows but one melanoma recorded in swine. Malignancy was suspected in this case, but histologically it proved to be benign. Melanin deposits in the skin of hogs are common.

TABLE VII—*Ages of affected animals.*

AGE GROUP	CATTLE	SHEEP	SWINE
6 months to 1 year.....	2	2	17
1 to 2 years.....	3	1	2
2 to 4 years.....	13	7	7
4 to 6 years.....	17	4	
6 to 8 years.....	20	20	
8 to 10 years.....	10		
Over 10 years.....	25		

TABLE VIII—*Breeds of affected cattle.\**

BREED	NUMBER
Hereford.....	39
Mixed.....	35
Holstein.....	8
Shorthorn.....	6
Jersey.....	2

\*Table VIII can not be used for comparative purposes as to the incidence of tumors in the various breeds, since no record was kept of the number of animals of each breed slaughtered.

It is estimated that 3 to 5 per cent of all slaughtered hogs show pigmented spots in the skin appearing as flat pigmented areas or raised wart-like surfaces. Feldman<sup>1</sup> regards the raised melanotic surfaces of an appreciable size as benign melanomas. Malignant melanomas do occur in hogs but are uncommon.

From the foregoing the following are drawn:

1. Food-producing animals are susceptible to all types of neoplasms.
2. Carcinomas predominate in cattle and sheep.
3. Carcinoma of the eye is the most common external tumor in cattle.
4. The adrenal gland in cattle and sheep shows a greater tendency to cancerous involvement than other internal organs.
5. Hogs seem to be less susceptible to carcinomatous growths.
6. The kidney in hogs is the common seat of neoplastic proliferation.

#### ACKNOWLEDGMENTS

The writers wish to express their appreciation to the veterinarians of the meat inspection force in Denver for their assistance in collecting specimens for this study, and to Dr. W. H. Feldman, of the Mayo Clinic, for making the histologic diagnosis of the tumors in this series.

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It is estimated that a cow drinks about ten gallons of water per day.



## CECAL ABLIGATION OF TURKEYS BY THE USE OF CLAMPS IN PREVENTING ENTEROHEPATITIS (BLACKHEAD) INFECTION\*

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Durant<sup>1</sup> has described an operation in chickens and turkeys by which the cecums may be ligated close to their junction to the main intestine, thus preventing the further passage of material into them and eventually resulting in severance of the cecums from the main intestine. He applied the term "cecal abligation" to this operation and suggested that probably it would be of benefit, especially in turkeys, in the prevention of enterohepatitis (blackhead) infection.

The technic of the operation consisted in making an incision through the left abdominal wall of the bird at the site commonly used in caponizing, and drawing the cecums, the necks of which lie opposite the operative incision, into a convenient location for the application of catgut ligatures to each cecum, close to its junction with the main intestine. The ligatures were applied in such a manner that they would effectively close the lumen but not tight enough to cut the outer cecal wall.

The mortality from the operation, as performed by Durant,<sup>2</sup> was high, as 43 out of 63 birds died as a result of the operation. It was considered to be effective in the prevention of enterohepatitis, however, as 12 birds with abligated cecums failed to contract the infection over the same period of time in which three controls contracted the disease and died.

Additional evidence to support the claim for the effectiveness of the operation in preventing enterohepatitis was reported by Durant,<sup>3,4</sup> who also has given a summary<sup>5</sup> of the results obtained with it over a period of three years. In this work he reported an average mortality of 47.2 per cent of all the birds operated on, various operative technics having been used. The mortality as a result of the operation varied from 13.6 to 60.3 per cent for the various operative technics described. One of the operations described was that of clamping the cecums by the use of aluminum clamps. Eight out of 14 (57.2 per cent) birds operated on died as a result of the operation. Complications were reported as having occurred in from 7 to 32 months following the operation,

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TABLE I—Results of cecal ablation of turkeys by clamping.

GROUP	AGE AT OPERATION (WEEKS)	DATE	BIRDS	MORTALITY FROM OPERATION		MORTALITY FROM BLACKHEAD		AVERAGE EXPOSURE OF BIRDS DYING FROM BLACKHEAD
				No.	%	No.	%	
I.....	3	5-15-32	21 operated 5 controls	4	19.1	1	5.9	5 months 3 weeks
II.....	3	5-23-32	14 operated 4 controls	3	21.4	0	0.0	6 months 4 weeks
III.....	3	6-15-32	50 operated 13 controls	10	20.0	2	4.0	5 months 6 weeks
Summary (groups I, II, III)....			85 operated 22 controls	17	20.0	3	4.4	5½ months 4½ weeks
IV.....	6	6-22-32	10 operated	1	10.0	0	0.0	
V.....	6	7-11-32	23 operated	20	87.0	0	0.0	
VI.....	7	7-12-32	54 operated 50 controls*	4	7.4	3	6.0	4 months 4 months
Summary (groups IV and VI)....			64 operated 50 controls*	5	7.8	3	5.1	4 months 4 months
Summary (all except group V)...			149 operated 72 controls	22	14.7	6	4.7	4¾ months 2½ months

\*These birds are used as controls inasmuch as they were with the operated birds on range.

as a result of the cecums becoming greatly enlarged and thickened. Of 26 birds on which information was available, 42.3 per cent developed this condition.

During the winter of 1932, in order to become familiar with the operation, 13 three-week-old chicks were operated on, aluminum clamps being used to abligate the cecums. Twelve of the 13 chicks recovered from the operation, so it was decided to try it on turkeys as a means of preventing blackhead infection. Inasmuch as the complications of cecal enlargement described by Durant occurred from 7 to 32 months following the operation, it was felt that this would carry the turkeys to marketable age and thus would not serve as a serious handicap.

The object of the experiment was to determine the mortality resulting from the operation in turkeys three, six and seven

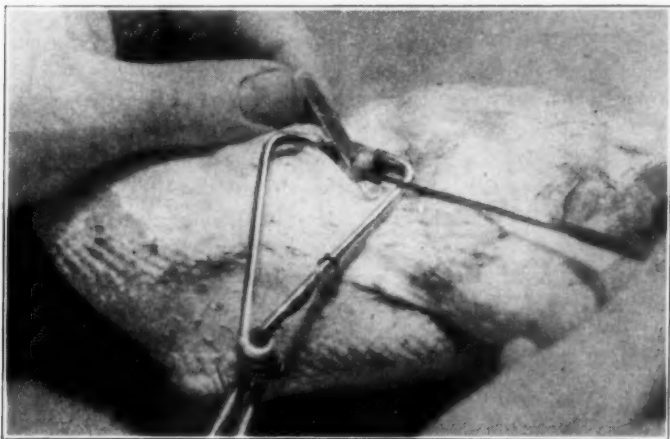


FIG. 1. Carcass of chicken demonstrating procedure of bringing the cecums into position for clamping.

weeks of age, and to determine the effectiveness of the operation in the prevention of blackhead infection.

#### EXPERIMENTAL PROCEDURE

Bronze turkeys were used in all the experimental groups shown in table I. The first three groups in table I were brooded in battery brooders until after recovery from the operation had occurred. Groups IV and VI were brooded in brooder-houses from the time of hatching until they were placed on range. Group V was brooded in a battery brooder for three weeks, at the end

of which time the birds were placed in a brooder-house. All of the birds received the same type of mash feed.

The operative procedure was similar to that described by Durant,<sup>1</sup> the incision into the abdominal cavity having been made on the left side, at the site commonly used in caponizing. The cecums were grasped by means of a blunt hook and brought into a convenient position for clamping. The clamps were placed about 5 mm from the junction to the main intestine and closed by means of pliers just sufficient to effect closure of the cecums but not sufficient to crush the underlying structures. The clamps used consisted of aluminum bands 5 mm wide by 0.5 mm thick. Following the operation, the birds were fed in the usual manner and the only postoperative treatment consisted in reducing wind-

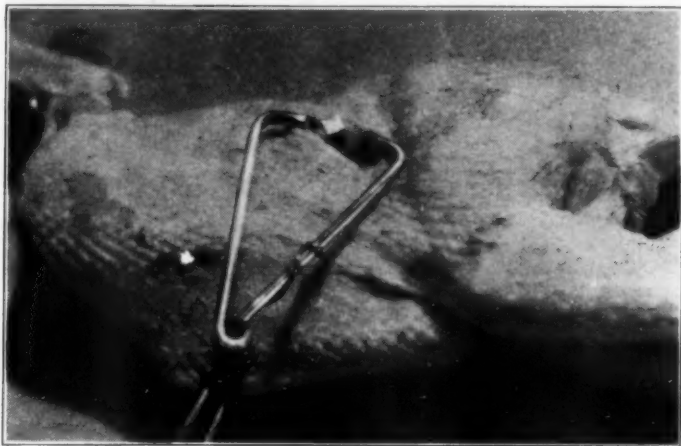


FIG. 2. Same as figure 1, shows the cecums and ready for replacement into the abdominal cavity.

puffs when they occurred. Food was not withheld from any of the groups prior to operation except group I, which was fasted 18 hours prior to operation.

The technic of the operation was similar in all the groups except group III. In clamping the cecums of this group, pliers were fixed in such a manner that the degree of closure was the same for all the birds of the group. This closure permitted a space between the bars of the clamps of 1.5 mm. This technic was used because it was felt that the mortality probably could be reduced by preventing too severe pressure from being applied to the walls of the cecums. As there was no material reduction in mortality, the technic was not used in subsequent groups.

Groups I and II were placed on blackhead-infected runs, from which mortalities from the disease were known to have occurred. As difficulty from coccidiosis infection was encountered from the range, the birds were removed to brooder-pens with cement floors and runs, where they remained throughout the course of the experiment. The birds of group III were placed along with groups I and II in the brooder-pen. All birds of these groups received blackhead material and embryonated heterakis ova artificially.

The birds recovering from the operation in groups IV and VI were placed on clean range, along with 50 non-operated birds of the same age. The range was rotated at weekly intervals.



FIG. 3. A portion of intestine and cecums of a turkey three months following the operation. The clamps are imbedded in connective tissue.

The birds of group V were affected with coccidiosis at the time of the operation, but were operated on to determine how significant this factor would be with regard to mortality from the operation. The intestines showed marked inflammation at the time of the operation, and the cecums of six birds were ruptured at the time, as a result of being more friable than normal.

All birds dying during the course of the experiment were autopsied carefully in an effort to establish the cause of death.

#### DISCUSSION

Table I shows the results of the operation in all of the groups operated on. There was a mortality of 17 from the 85 (20 per cent) turkeys operated on at three weeks of age, as a result of peritonitis, due to leakage from the points of clamping. Fifteen of 22 control birds died from blackhead infection, giving a mortality rate of 68.2 per cent.

Three of the operated birds from the first three groups died

from enterohepatitis infection, approximately five months following the operation. It will be noted that the average time in which blackhead had produced death in the controls was approximately four and one-third weeks, which is a much shorter period of exposure than in the operated turkeys. Four of the control birds of these groups survived during the duration of the experiment, three of the seven which did not contract blackhead having died from other causes.

Groups IV and VI were six and seven weeks old, respectively, at the time of operation. Five birds out of 64 died as a result of the operation from peritonitis due to leakage from the points of clamping. These birds, along with 50 non-operated birds, were placed on a clean range which was rotated at weekly intervals. The object in operating on this group was merely to find whether or not age is a factor in the operation. It was found that these birds were more easily operated on than those at three weeks of age, and death as a result of the operation was considerably less in birds of this age than in those operated on at three weeks of age. Durant<sup>5</sup> had suggested that turkeys eight weeks old are desirable for the operation.

No enterohepatitis infection was encountered with these birds over a post-operative period of four months, at which time ten of the non-operated and three of the operated birds contracted the disease and died. Probably the source of the infection was from drinking-water furnished these birds by mistake from a brook which ran through a range used for chickens.

The examination of the six operated birds dying from enterohepatitis from all groups showed five with one or both cecums functioning, thus permitting the infection to become established. The other bird showing the primary lesion in the diverticulum, resulting from the complete separation of the cecums from the main intestine.

The cecums of the birds in which function had been resumed showed a constriction at the points of clamping and on the mucous surface a distinct scar formation, showing that at some time the mucosa had been completely severed.

The lumen of the cecums of turkeys dying in from one to four months following the operation were found completely occluded. Complete separation of the cecums from the main intestine had not occurred in some cases. The clamps of the cecums in which complete separation had not occurred were found completely embedded in connective tissue at the point of clamping.

It is probable that the cecums resume functioning as a result of bacterial infection from around the embedded clamps, which



at first forms a fistulous tract through the portion that had been completely occluded by them. Once the fistulous opening is created, the passage of material through it would produce a much constricted lumen and function as such. Additional evidence to support this view is the fact that quite often the clamps were found within the lumen of the cecum at its blind extremity, being unable to pass out the narrow, refunctioning lumen.

The examination of 27 birds, autopsied from one to six months following the operation, is shown in table II. The cecums had not refunctioned in any of the birds examined prior to four months following the operation.

TABLE II—*Postoperative examination of 27 turkeys one to six months following operation.*

TURKEYS EXAMINED	TIME AFTER OPERATION (MONTHS)	ONE CECUM FUNCTION- ING	BOTH CECUMS FUNCTIONING		ENLARGED CECUMS	NORMAL CECUMS
			No.	%		
9	1 to 4	0	0	0	2	7
18	4 to 6	9	6	66.7	5	3

Of 18 turkeys examined between four and six months following the operation, 66.7 per cent showed one or both cecums functioning. Inasmuch as these are only a small portion of the 149 operated upon, the percentage showing one or both cecums functioning might have been somewhat higher than might be expected if all the operated birds had been examined. It is of sufficient importance to question the practicability of the operation performed in the manner described in this paper.

A number of the birds showed enlarged cecums after the fourth month, but they were not of sufficient significance to interfere with the health of the birds at least six months after operation. It would seem that this phase would be of no important significance unless the birds were to be carried on for breeders.

Group V (table I) represents the effects of the operation on 23 turkeys six weeks of age at the time of operation. Twenty of the 23 died from peritonitis as a result of the operation. The cecums of six of the birds were ruptured during the operation, due to the walls of the cecums being inflamed, swollen, and thus more friable than normal. The operation is hazardous and contraindicated in birds showing intestinal irritations.

## SUMMARY

1. Mortality from cecal abligation by clamping resulted in an average mortality of 14.7 per cent for all turkeys operated on, with the exception of group V (table I).

2. The mortality from the operation was less in the birds operated on at six and seven weeks of age than in those operated on at three weeks of age. Five out of 64 operated on at six and seven weeks of age died as a result of the operation, a mortality of 7.8 per cent. Seventeen out of 85 operated on at three weeks of age died as a result of the operation, a 20 per cent mortality.

3. Fifteen (68.2 per cent) of the control turkeys of groups I, II and III, under extreme exposure to enterohepatitis infection, contracted the disease and died, with an average exposure period of four and one-third weeks. Three (4.4 per cent) of the operated birds contracted the infection and died, with an average exposure period of approximately five months. None died from enterohepatitis in less than five months following the operation.

4. Three (5.1 per cent) of the operated birds of groups IV and VI contracted blackhead, as against 20 per cent for the non-operated birds on range with them.

5. Twenty of the 23 birds operated on at six weeks of age (group V) and suffering from coccidiosis died following the operation, thus showing the operation to be hazardous when this infection is present.

6. Five of the six operated birds dying from enterohepatitis showed one or both cecums to have resumed functioning. This was not observed to have occurred in less than four months following the operation. The examination of 27 birds autopsied showed 66.7 per cent of those observed four to six months after the operation with one or both cecums functioning.

7. As one or both cecums have been found to resume functioning approximately four months following the operation, the practical value of the use of this operation becomes somewhat questionable. A possible explanation as to the cause of the cecums refunctioning is offered, being that bacterial action in and around the embedded clamps probably results in a fistulous opening which becomes increased in size due to the passage of material in and out of the cecums.

8. The operation was effective in preventing blackhead for a period of four months, as none of the birds operated on contracted the infection in less than this period of time, even when exposed to severe infection.

9. A number of turkeys showed enlarged cecums following the operation but these were not of significant importance to make the operation impracticable if the birds are to be marketed at the usual time and not carried on for breeders.

10. The average mortality as a result of the use of this technic was considerably lower than that reported by Durant using a similar technic.

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<sup>2</sup>Durant, A. J.: Entero-hepatitis in turkeys. *Mo. Agr. Exp. Sta. Bul.* 244 (1926), p. 60.  
<sup>3</sup>Durant, A. J.: Cecal ablation for prevention of entero-hepatitis in turkeys. *Mo. Agr. Exp. Sta. Bul.* 256 (1927), p. 100.  
<sup>4</sup>Durant, A. J.: The control of blackhead in turkeys by cecal ablation. *No. Amer. Vet.* x (1929), p. 52-55.  
<sup>5</sup>Durant, A. J.: Blackhead in turkeys—surgical control by cecal ablation. *Mo. Agr. Exp. Sta. Res. Bul.* 133 (1930), pp. 1-32.

### Indiana State Live Stock Sanitary Board Reorganized

The personnel of the Indiana State Live Stock Sanitary Board now is as follows: The veterinary members are Dr. T. A. Sigler (Ind. '02), of Greencastle, and Dr. H. Meade Hamilton (Ind. '09), of Muncie. The lay members are Mr. R. M. Core, of Franklin; Mr. C. C. Palmer, of Albion, and Mr. Maurice C. Johnson, of Aurora. Dr. Sigler, Mr. Core and Mr. Johnson are Democrats, and Dr. Hamilton and Mr. Palmer are the Republican members of the Board.

As announced in an editorial on page 813 of the July issue of the *JOURNAL*, Dr. J. L. Axby (Chi. '03), of Lawrenceburg, became State Veterinarian on May 1. Dr. H. F. Emick (McK. '01), of Indianapolis, is Assistant State Veterinarian. He has been attached to the office since August 1, 1928. Dr. John O. Riester (Ind. '10), of Salem, and Dr. S. E. Bowman (Ind. '11), of Odon, were appointed supervising inspectors, effective June 1. The following entered the employ of the Board, during June, as state inspectors: Dr. V. F. Saylor (Ind. '14), of Zionsville; Dr. Lancy Conrad, of Marengo; Dr. Claude Weber, of Oakville; Dr. Dan Scudder (Cin. '13), of Patriot, and Dr. S. D. Wiles (Ind. '17), of Fort Wayne. Dr. A. G. Feil (Ind. '15), of Indianapolis, retained his position as yard inspector, and Dr. John D. McLeay (Ind. '13), of Indianapolis, as laboratory assistant. Dr. L. O. Fish (Ind. '16), of Spencer, became a state inspector, July 1. Dr. F. G. Roth (Ind. '17), of Crown Point, continues as state inspector in Lake County until the County becomes reaccredited as a modified area, which is expected to be about January 1, 1934.

## FIELD INVESTIGATIONS RELATIVE TO CONTROL OF OESTRUS OVIS\*

By W. C. MITCHELL and N. G. COBBETT†

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In order to secure information needed as a basis for developing control measures for *Oestrus ovis*, so-called "grub in the head" of sheep, investigations were carried out on various phases of the problem, especially as regards the prevalence of the grubs and the damage to infested animals and tests were made of the most widely mentioned method of control or eradication, the use of pine tar as a repellent for the fly. Observations incident to these investigations developed the fact that certain statements commonly made in regard to the life history do not apply to *Oestrus ovis* in lambs in the areas in which we worked.

### AREAS INVOLVED

These investigations were conducted in western Texas and eastern New Mexico, during the spring and summer of 1932.

The work in Texas was carried on by Mitchell, in the vicinity of San Angelo. This area, in the plains section of west Texas, has an altitude of approximately 1,800 feet and a moderate to warm climate.

The work in New Mexico was carried on by Cobbett, in the vicinities of Roswell and Las Vegas. This area provided a variation in altitude of from 3,500 feet in the plains section surrounding Roswell, to 6,500 feet in the foothills area near Las Vegas, with climatic conditions varying from moderately warm, in the Roswell section, to colder in the higher altitudes of the Las Vegas region.

### EXTENT AND NATURE OF INFECTION

In Texas the heads of lambs only were examined for *Oestrus ovis* larvae, and no data are available on the infestation of older sheep in this area. Approximately 87 per cent of the untreated lambs, killed and examined in connection with the experiments in Texas, were infested.

In New Mexico the heads of sheep, which ranged from 2-month-old lambs to aged animals, were examined. Of 61 heads opened

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†Both authors are members of the field force working under Dr. Marion Imes, Inspector-in-charge, Zoölogical Division, Kansas City, Kan.

and examined 59 (approximately 97 per cent) were infested with *Oestrus ovis* larvae.

In the examination of sheep heads in both the Texas and New Mexico areas, the number of larvae found in individual heads varied from 1 to 40. Grubs in all stages of development, from minute first-stage larvae to fully developed grubs, often were observed in the same head. The minute first-stage larvae were found principally in the nasal passages on the mucous lining of the nasal septum, turbinate and ethmo-turbinate bones, and the meatus nasi. The young larvae evidently migrate, as a rule, to the frontal sinuses for further development, as the majority of intermediate and last-stage larvae were found in these cavities. Very few larvae were found in the maxillary sinuses.

#### DAMAGE

During the course of these investigations, the postmortem examinations of the heads of sheep usually revealed little pathological change in the tissues affected by live larvae, even when heavily infested, other than an increase of mucous secretion in the head cavities occupied by them. Only in occasional cases in which dead larvae were encountered in the frontal sinus or folds of the turbinate bones, was there evidence of inflammation of the affected tissues, with discoloration and thickening of the mucous membrane and the presence of a thick discolored secretion.

In our investigations, with up to 40 grubs present in sheep, there was little evidence against this parasite as being directly responsible for large death losses among sheep, and deaths caused directly by grub in the head would seem to be the exception rather than the rule under these conditions. However, it is reasonable to assume that the excessive mucous secretion produced by *Oestrus ovis* larvae in the head cavities is one of the primary factors in causing the common catarrhal condition of the noses of sheep, known as "snotty nose," which may be accompanied by bacterial invasion and subsequent complications. The connection between the grubs and "snotty nose" appears to be well established by observations made in many lands and for many years. Furthermore, gross infestation with larger numbers of grubs than we found may cause mechanical obstruction, which, when added to a profuse catarrhal secretion, might result in one way or another in the deaths of sheep. Fine punctiform hemorrhages in linear arrangement on the nasal mucosa have been reported as caused by these grubs, and although not

yet observed in our examinations, these, when present, may lead to bacterial infections of a more severe sort by affording entrance for pathogenic bacteria into the tissues.

However, it should be kept in mind that, in both areas involved here, the climate is dry and unfavorable to bacterial infections of the respiratory tract. In low, wet areas with a moist atmosphere, the likelihood of serious bacterial infections of the respiratory tract is much greater.

Observations made during these investigations, of sheep in feed-lots, corrals and pastures and on the range, brought out vividly the efforts made by sheep to protect themselves from the adult flies of *Oestrus ovis*. On warm, still days when the flies were especially active, sheep, if left to themselves, would gather in bunches with their heads protected and, when forced to move away, would run a short distance with their noses near the ground only to bunch together again, all of which interfered with their feeding and proper management.

#### CONTROL METHODS

The fact that only dead grubs were found associated with pathological changes in the tissues affected by *Oestrus ovis* larvae, and that such conditions were not apparent in the tissues affected by live larvae, raises in our minds the question as to the value of any method of treatment intended to kill larvae in the cavities of the head or at least in the frontal sinuses. We do not undertake at this time to pass an opinion on this question, but propose it for consideration. Presumably, larvae killed in the nasal passages would be sneezed out or otherwise removed as a rule. However, our efforts were confined to tests of the commonly recommended method of preventing the deposition of young larvae in the nostrils of sheep by the use of pine tar, and thus also reducing the likelihood of their migration to the nasal passages after being deposited.

The experiments conducted in Texas to determine the repellent effect of pine tar for the adults of *Oestrus ovis* were carried on with several flocks of sheep. In these experiments part of the sheep were treated and the remainder left untreated to serve as controls and for general observations. Treatments were given at intervals of 15 days in one group, 10 days in another, and 3 to 4 days in another.

To insure thoroughness of application, the repellent was applied by hand. A generous amount of commercial pine tar was applied with a paint brush to the nose of each sheep treated.



TABLE I—Results in sheep treated by hand applications of pine tar, and in untreated sheep.

FLOCK	SHEEP	TREATED	TREAT- MENT BEGUN (DATE)	DAYS BETWEEN TREAT- MENTS	SLAUGH- TERED (DATE)	LAMBS SLAUGHTERED		GRUBS COLLECTED		GRUBS PER ANIMAL (AVER.)	
						TREATED	UN- TREATED	TREATED	UN- TREATED	TREATED	UN- TREATED
1	775	387	2-5	15	6-16 and 6-24	58	62	288	420	5.00	6.8
2	700	90	4-14	10	7-9	23	26	116	192	5.00	7.4
3	3,800	131	4-19	3-4	7-20	43	119	226	595	5.25	5.0

In cool weather it was found necessary to soften the pine tar by placing the container in a hot-water bath.

As the lambs in the experiment flocks became ready for market, they were shipped to the packing-house where they were killed and the heads examined for *Oestrus ovis* larvae.

The degree of infestation in treated and untreated lambs was arrived at on the basis of the average number of larvae per animal. A comparison of the average infestation in the two groups affords a means of judging the effectiveness of the repellent. By referring to table I it will be noted that the degree of infestation was slightly higher (about 2 grubs more per animal) in the untreated animals of flocks 1 and 2, and a fraction higher (one-fourth grub more per animal) in the treated animals of flock 3.

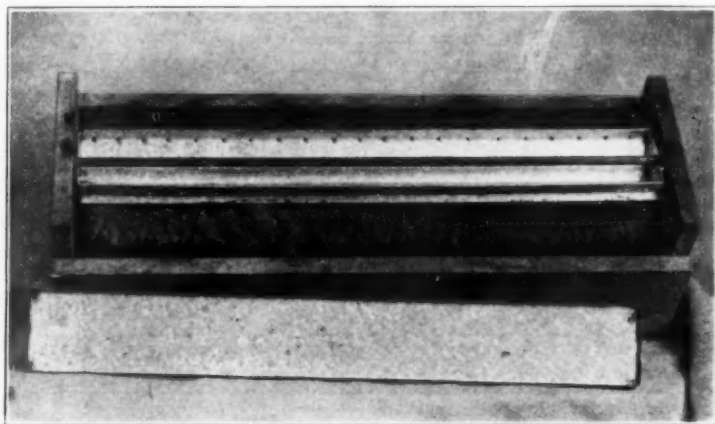


FIG. 1. Improved type of salt-trough with automatic device for applying tar to noses of sheep. (Front view.)

The results shown in table I indicate that commercial pine tar, when applied at intervals of from 3 to 15 days, is not an adequately effective repellent for the adults of *Oestrus ovis*.

This may be due to the fact that the tar assumes a glazed appearance and becomes covered with a thin film of dust a few hours after application. Possibly this dried mixture of pine tar and dust loses any repellent value that the fresh pine tar may have.

#### METHODS OF APPLICATION

In New Mexico, small flocks of sheep, suitable for experimental purposes in the hand application of fly repellents, were

not available, and since any treatment with repellents must necessarily be applicable to range conditions, if it is to have general utility, the experiments in this area were confined to developing some method whereby the repellent would be applied automatically to the noses of sheep.

With this idea in mind, salt-troughs of different types were constructed and used in these experiments. In all types the openings through which the sheep took the salt were padded with sheep-pelt pads which were kept saturated with repellent. The repellent used was a mixture of 2 parts of pine tar to 1

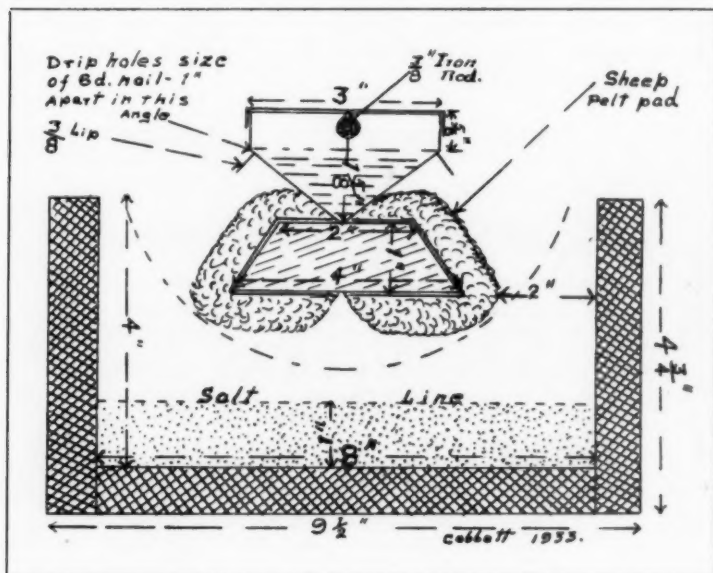


FIG. 2. Improved type of salt-trough with automatic device for applying tar to noses of sheep. Cross section. (One-third actual size.)

part of cottonseed oil. The first troughs had 3-inch circular openings through the trough covers; few sheep took salt readily from this type of trough. A second type was constructed with a 3-inch slot running lengthwise of the trough cover; sheep took salt more readily from this type of trough but it was found necessary to apply the repellent to the pads every other day. To overcome the objectionable feature of frequent renewals of the repellent, a third type of trough (figs. 1 and 2) was constructed with a swinging pad mounted on an iron rod running lengthwise over the middle of the trough. A metal tank containing the repellent was mounted over this pad so

that the repellent was spilled over the pad when the latter was tipped by the noses of sheep when taking salt.

The flocks used in these experiments consisted of sheep of various ages from new-born lambs to aged animals. The young lambs often were observed nosing about the troughs and as a result a large percentage of them kept their noses well tarred.

Frequent observations of marked sheep showed that some individuals kept their noses well tarred throughout the course of the experiments, others showed evidence of the tar only intermittently, while others remained apparently free from the tar. After the removal of the salt-troughs from sheep pastures, it was observed that evidence of the repellent on the noses of the sheep was absent after a period of three days.

After sheep had had access to the troughs for 21 days, they were caught and examined and each animal was classified on the degree of tarring evident on the nose. The results of this classification were as follows: good application, 31.8 per cent; fair application, 33.5 per cent; little or no evidence of repellent, 34.7 per cent.

The above observations and the classification of results indicate that the salt-trough method of applying a fly repellent to the noses of sheep has some promise of possible usefulness, as far as the matter of application is concerned. The previous experiments indicate the desirability of finding more effective repellents.

#### SUMMARY

1. *Oestrus ovis* is prevalent throughout western Texas and eastern New Mexico, with indications that a large percentage (87 to 97) of the sheep are infested.

2. The infestation of individual sheep varied from 1 to 40 larvae, all stages of larval development often being observed in one head.

3. Minute first-stage larvae, in the majority of cases, appear to migrate from the nasal passages to the frontal sinuses for further development. Infestation of the maxillary sinuses seldom was observed.

4. No evidence was found to show that *Oestrus ovis*, in Texas and New Mexico and in such infestations as were observed, is a lethal factor in causing the death of sheep in large numbers, but it is a factor in causing excessive nasal discharge with accompanying detrimental effects.

5. Pathological changes in the tissues affected by *Oestrus*

*ovis* larvae were observed only in cases where grubs had died within the head cavities.

6. In view of the fact that dead larvae which become lodged in the cavities of the head, especially the frontal sinus, produce pathological conditions, we raise the question as to the value of treatments intended to kill these grubs in this location. Methods of control or eradication of *Oestrus ovis* apparently should stress preventive measures rather than the destruction of larvae within the head cavities.

7. Our observations are in agreement with those previously reported to the effect that the activity of the sheep gadfly interferes with the proper feeding and management of sheep.

8. A thorough application of commercial pine tar to the noses of sheep at intervals of twice a week to once in two weeks has very little repellent effect on the adult fly.

9. The results obtained in experiments with the salt-trough method of applying repellent to the noses of sheep show some promise of usefulness. A new type of applicator for tarring the noses of sheep was developed and is described here.

#### REFERENCES

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### Exhibit on Veterinary Research

Veterinary research work is emphasized in the exhibit of the Burroughs Wellcome & Co., at A Century of Progress, Chicago. Some of the work carried out includes investigation of such diseases as lamb dysentery, dog distemper, braxy in sheep, canine jaundice, bacillary white diarrhea, tetanus and fowl-pox. The striking reduction in lamb dysentery, following the use of serum and vaccine, is shown, as well as the progress that has been made in protecting dogs against distemper with the vaccine developed by Dunkin and Laidlaw.

An interesting and informative section of the exhibit is that devoted to tropical diseases, grouped according to their infective agents, bacterial or parasitic, together with the therapeutic agents used in treatment. The central feature of the exhibit is an automatic photographic projector which simultaneously projects on four screens four different photographs relative to medicine, first-aid, travel and photography.

## THE TOXICITY OF DRYMARIA PACHYPHYLLA FOR CATTLE, SHEEP AND GOATS\*

By FRANK P. MATHEWS, *Alpine, Texas*

*Loco Weed Laboratory, Texas Agricultural Experiment Station†*

J. T. Lantow<sup>1</sup> proved that *Drymaria pachyphylla* was the cause of some important cattle losses which had occurred on the ranges of New Mexico for a number of years. Although his investigations established the etiology of such losses, they revealed but little as regards the symptoms or pathology which would be of assistance in rendering a diagnosis.

On August 26, 1932, the writer's attention was called to some important cattle losses which were occurring on the ranges in southwestern Reeves County near Balmorhea, Texas. A mortality of something over 100 head had occurred among 3,000 cattle on three ranches. Range conditions were found to be very poor on account of a prolonged drouth. Early summer showers had yielded sufficient moisture to sprout and grow *D. pachyphylla*, but no other succulent plants had appeared. The ranchers were convinced that this plant was responsible for the losses, in spite of the fact that it was being eaten in but small quantities. In so far as can be determined, this is the first report of losses from this plant in Texas.

### BOTANICAL DESCRIPTION OF DRYMARIA PACHYPHYLLA‡

The genus *Drymaria* is of the chickweed tribe of the pink family. The specific name, meaning thick-leaf, indicates that the plant in growing condition is succulent, or full of juice. This juice is purplish in color. The plant itself is an annual and grows flat on the ground with a spread of four to ten inches. It is sparingly branched, and entirely free from hair. The leaves and sepals are covered with a bluish-white bloom which gives the plant a bluish-gray appearance. The leaves are small, opposite in pairs, entire, covered with a bluish-white bloom, and thick and juicy; the basal leaves are tongue-shaped. The stem leaves are broadly ovate, obtuse, less than half an inch long, about one-fourth inch wide, and are narrowed into a slender stalk one-half as long as the blade or more. The flowers are small, inconspicuous and solitary on rather stout stalks. The stalks are one-eighth of an inch long and are clustered in the axils of the leaves. The

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‡The description of the plant was prepared by V. L. Cory, Texas Agricultural Experiment Station, Sonora, Texas.



petals are small, five in number, white in color, and are deeply two-cleft. The sepals are five in number, oblong in shape, one-eighth of an inch long, covered with a bluish-white bloom, and have thin, papery white margins. The flowers have five stamens and three styles. The styles are not branched to the base. The fruit is dry, one-celled, about one-eighth of an inch long and two-thirds as broad as long. The fruit opens at maturity by its three longitudinal valves. The seeds are very small, twenty, more or less, to each fruit, black and dull, about  $\frac{1}{32}$ -inch long and two-thirds as broad, flattened, broadly rounded at one end with the other end prolonged into a slender point.

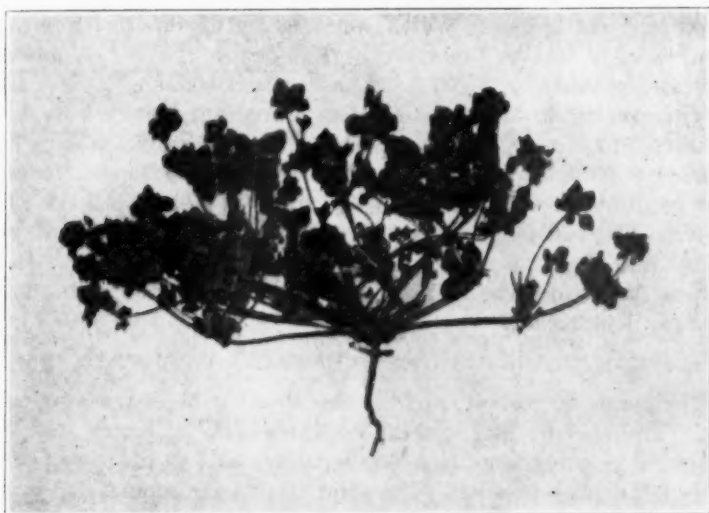


FIG. 1. A pressed specimen of *Drymaria pachyphylla*. (About one-half actual size.)

This plant grows in southern New Mexico, especially in the Rio Grande Valley, and southeastward into Texas, as far east at least as the southwestern corner of Brewster County and north and east therefrom as far as Balmorhea in southwestern Reeves County.

Very little information could be obtained from the ranchers concerning symptoms as all but one of the animals had been found dead on the ranges. One bull had been found in a serious condition and was reported as being quite restless, bawling and passing blood in the feces for two days prior to death. From a diagnostic standpoint such symptoms are of little value, and since the available literature was of no greater assistance, some feeding

tests were conducted with the hope of obtaining more definite knowledge upon the symptoms and pathology of this type of plant poisoning. The plant was ground in a meat-chopper, packed into the chamber of a balling-gun and administered as a bolus. Sufficient water was added to the dry plant to facilitate feeding, but nothing was added to the green plant. The force feeding was adopted in order to obtain quicker results, as it was evident that a prolonged period of starvation would have been required in order to overcome the natural distaste for the plant. The results of the feeding tests are summarized in table I.

TABLE I—Results of feeding *Drymaria pachyphylla*.

ANIMAL	WEIGHT (LBS.)	AMOUNT FED PER 100 LBS. LIVE WEIGHT (GRAMS)	DATE FED (1932)	RESULTS
Sheep 22	60	217	Oct. 7, 11 a.m.	Found dead after 21 hrs.
Sheep 23	60	108	Oct. 7, 11 a.m.	Found dead after 21 hrs.
Sheep 17	65	60	Oct. 11, 11 a.m.	Sick after 23 hrs., lasting 2 days. Recovered
Sheep 21	60	50	Oct. 11, 11 a.m.	No ill effects
Goat 36	105	90	Sept. 22, 3 p.m.	Sick on second day. Died after 89 hrs.
Goat 5	65	172	Sept. 22, 3 p.m.	Sick after 24 hrs. Died after 41 hrs.
Bull 83	550	741*	Aug. 27, 11 a.m.	Found dead after 21 hrs.
Cow 56	665	74	Oct. 13, 2 p.m.	Found dead after 17 hrs.
Heifer 87	275	32	Nov. 1, 3 p.m.	No ill effects
		65	Nov. 4, 3 p.m.	No ill effects
		147	Nov. 7, 3 p.m.	Found dead after 20 hrs.
Steer 85	495	83	Nov. 7, 3 p.m.	No ill effects
		109	Nov. 14, 3 p.m.	Sick after 22 hrs. Recovered

\*Fed green. All other feedings were dry.

The fact that 65 grams of the dry plant (equivalent to 162 grams of the green, or 0.6 per cent of the body weight of the animal) was sufficient to produce death in a sheep in less than 18 hours, and that 39 grams rendered a second animal very sick for two days is ample proof of the extremely toxic nature of this plant. In the case of one cow (56), 495 grams of the dry plant (equivalent to 2.75 pounds of the green, or 0.4 per cent of the body weight of the animal) was sufficient to produce death in less than 17 hours. Evidently a much smaller dose would be sufficient to render a cow very sick. Unfortunately, at this stage of the investigation the supply of the plant, which had been hand-

picked and well cured, was exhausted and a second batch had to be used in feeding cattle 85 and 87. The second batch of the plant was grubbed and cured in an open shed. Repeated exposure to rains had caused considerable soil to adhere to the plant, thus rendering actual weights impossible. Therefore, the weight of the material which was fed to cattle 85 and 87 does not represent the actual weight of undamaged plant.

A diarrhea and loss of appetite appeared to be the first evidence of toxicity in all but the extremely acute cases. The animals remained on their feet most of the time and were quite restless; when motionless there was a slight arch to the back and a tucked-up abdomen. Stamping of the hind feet sometimes was observed. Temperature, pulse and respiration were practically normal with the exception of a slight grunt upon expiration. In some cases the initial symptoms changed very soon to a period of depression, lethargy, coma and death, with no tendency to struggle as death approached. Perhaps the most outstanding feature was the short period between the appearance of the first symptoms and death; in one case a period which was known to exceed less than two hours. Following the administration of sublethal doses, recovery was complete in about two days following the appearance of the first symptoms.

Hemorrhage predominated in the gross pathology, a change which was quite prominent beneath the epicardium and extended well into the myocardium of the left ventricle, but no lesions were found beneath the endocardium of the right ventricle. The change in the left ventricle was the most outstanding and constant lesion, with the exception of an edematous infiltration in the wall of the gall-bladder. The wall of this organ was very much thickened and in some cases hemorrhagic. As a rule the edematous infiltration continued along the course of the bile-duct and also involved the peritoneum for several inches both anterior and posterior to the entrance of the duct into the duodenum. The liver and spleen showed marked congestion, both organs being darker in color than normal. The spleen was swollen and when an incision was made through the capsule, blood dripped from the cut surface. The diaphragm was sprinkled with numerous hemorrhages. Involvement of the alimentary tract consisted of congestion of the mucosa, beginning with the abomasum, and increased in severity as the posterior third of the small intestine was approached. Hemorrhage into the lumen of the anterior two-thirds was variable but was a constant finding in the posterior third. There was a mild congestion of the mucosa of the large

intestine. The kidneys were congested and showed some parenchymatous degeneration.

The most outstanding histopathology was observed in the liver and gall-bladder. Around the central veins there was marked congestion and some hemorrhage. The hepatic cells within the congested areas showed considerable evidence of necrosis. The nuclei exhibited the usual staining reactions of necrosis but the cytoplasm took an unusually brilliant, eosin stain. This staining reaction of the cytoplasm in conjunction with the well-stained red blood-cells rendered the areas surrounding the central veins very prominent. In some cases the necrosis involved the entire lobule, but as a rule there was a well defined border between the necrotic area and the periphery of the lobule. In such areas there was a mild fatty infiltrative degeneration but no necrosis.

As was to be expected from the postmortem observations, the continuity of the tissues of the gall-bladder was much distorted on account of the edematous infiltration. In addition to this change the mucous membrane showed a complete necrosis of the surface epithelium and of most of the glandular elements, although an occasional glandular structure was found in which the necrosis had not entirely destroyed the staining reaction of the nuclei. In some areas the necrosis extended to the musculature.

In the kidneys there was congestion, albuminous degeneration of the epithelium of the convoluted tubules and an occasional area of focal necrosis. There was very little change in the straight tubules and no evidence of cast formation.

The intestinal mucosa showed congestion and hemorrhage, but practically no retrograde changes of the epithelium. The change in the spleen consisted of congestion and hemorrhage.

Anemic infarctions were observed in the mucosa of the small intestines and the adjacent lymph-nodes of the goats. The infarctions were due to fibrinous thrombosis, a change which was observed in both arteries and veins adjacent to the infarcted areas. Thorough search failed to reveal similar changes in either the cattle or sheep.

#### DISCUSSION

Both the symptoms and lesions in this condition are of little assistance in rendering a diagnosis. The lesions, although quite prominent, can hardly be differentiated from the changes which are found frequently in other diseases showing a tendency to develop hemorrhages. The diagnosis, therefore, should be governed

by a consideration of range conditions, the presence of *D. pachyphylla* and whether or not the animals are eating the plant. The rapidly fatal result, as in the case of heifer 87, is probably significant. This animal was fed some of the plant at 3:00 p. m., November 7, 1932. She was eating at 9:00 a. m. the next day and showed no signs of morbidity. Two hours later, that is, at 11:00 a. m., November 8, she was found in a comatose condition and died a few minutes later. When such results are considered it is not surprising that affected animals are found dead on the ranges without the owner having noted evidence of sickness.

The fact that the anemic infarctions were confined to goats is of special interest. This phase of the pathology may be explained by the species of the animal. However, it will be recalled that the goats lived much longer than the rest of the animals, after they were fed the plant, thus suggesting a time factor in the production of thrombosis and anemic infarctions.

From range observations in this state as well as in New Mexico, it is evident that the plant is of very low palatability and will rarely be eaten if anything like suitable forage is available. Consequently it would be reasonable to expect that supplementary feeding, during periods when losses are liable to occur, would reduce such losses to a minimum. It was of interest to note that the plant was about mature when the investigation was made, and that it gave no further trouble after the first of September. Heavy rains which occurred the latter part of August were quite destructive to the plant and at the same time provided an abundance of forage. Owing to the extremely toxic nature of the plant and the fact that nothing is known concerning the toxic principle, nothing can be suggested in the way of treatment.

#### SUMMARY

Some important cattle losses in southwestern Reeves County, near Balmorhea, Texas, were found to be due to eating *Drymaria pachyphylla*. Losses from eating the plant appear to occur only during periods of unfavorable range conditions.

The plant caused death in a sheep when fed at the rate of 0.6 per cent of the body weight and in a cow when 0.4 per cent of the body weight was fed. The goat seems much more resistant as it required 0.97 per cent of the body weight to cause death.

The symptoms and pathology were found to be of but little assistance in arriving at a diagnosis.

#### REFERENCE

- <sup>1</sup>Lantow, J. T.: N. M. Agr. Exp. Sta. Bul. 173 (1929).



## IMPERFORATE HYMEN IN A HEIFER\*

*By B. A. ZUPP, Waltham, Minn.*

The subject was a two-year-old Shorthorn heifer, attempting to deliver her first calf. Upon my arrival, the client stated he could feel the calf but she was still completely closed.

The heifer had been laboring about eight hours but had made no progress. Every time she strained, a mass resembling a vaginal prolapse appeared, only to return when straining ceased. Upon examination it was found that the hymen was complete and very heavy. When carefully examined, a small band was found on the posterior surface of the hymen and underneath it was a scar. The posterior genitalia were markedly relaxed and the calf was back against the hymen. A hole was made through the hymen with the finger in the region of the scar and immediately the cervical seal flowed out and the fetal membranes were visible. The hole was enlarged to admit the hand, and in about 45 minutes the heifer had given birth to a normal, live heifer calf.

Evidently the hymen had been perforated by the penis of the bull at the time the heifer was bred, allowing conception, but the tissues had healed and closed the opening.

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## NEURITIS IN SWINE ASSOCIATED WITH ATYPICAL POSTERIOR PARALYSIS†

*By L. P. DOYLE, Lafayette, Ind.*

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Atypical paralysis and weakness of the hind limbs were observed in swine. There were approximately 20 animals affected in a head of 300 shotes, from four to six months of age. The

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†Received for publication, June 7, 1933.



disease occurred during the summer months, while the shotes were on pasture, mainly blue grass, and were being fed a ration of corn and tankage.

The first symptom noted by the owner was stamping of the hind feet. Later, the affected animals lifted the hind feet very high in walking and usually showed weakness and incoördination of the hind parts. In a few instances paralysis of the hind parts developed, but generally the affected animal continued to show

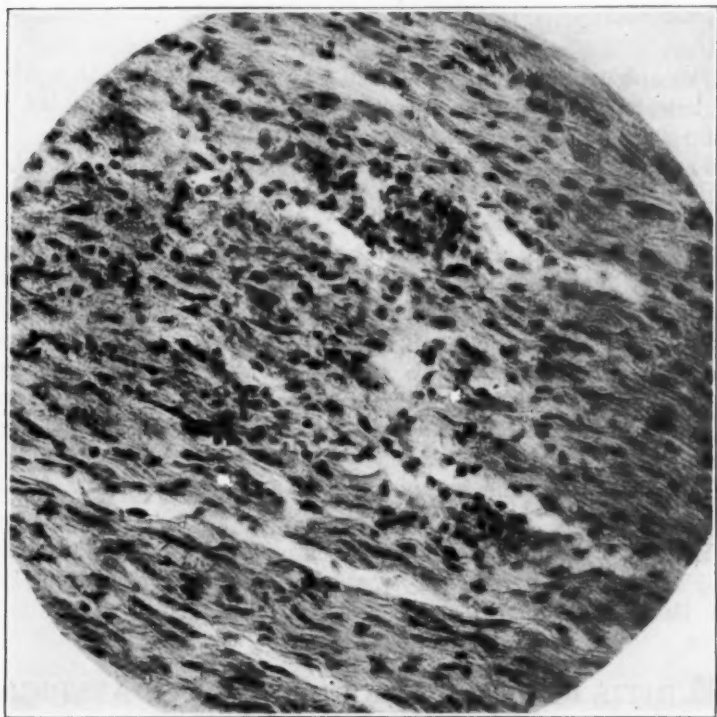


FIG. 1. Photomicrograph of a section of the peroneal nerve, showing a patchy cellular infiltration.

the peculiar "stringhalt" movement without definite paralysis. The appetite remained good; and no other general symptoms were noted.

There was an opportunity to make a postmortem examination of only one animal. No skeletal defects or other readily recognizable gross lesions were found. The peroneal nerve apparently was slightly swollen and more grayish than normal.

A microscopic examination of the peroneal nerve showed a

well-marked cellular infiltration of portions of the trunk. The majority of the infiltrating cells was round or lymphoid in type. However, there was an occasional eosinophilic polymorph. Cells of the type of plasma cells also occurred rather commonly. In cross-sections of the nerve, the inflammatory process did not appear to involve the entire trunk, but was limited to one or two fasciculi.

#### DISCUSSION

In the writer's experience, it has been rare to find such definite inflammatory changes as are reported here in the nerve trunks of cases of posterior paralysis in pigs—even in instances in which no gross skeletal abnormality could be found. An examination of more pigs from this herd of course would have increased greatly the value of this report. It seems likely, however, that the changes found in this one pig also occurred in the other affected pigs.

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#### Selling Cholera-Infected Hogs

A complaint has been filed by two Missouri farmers against an Illinois farmer who purchased 36 hogs, alleged to have been infected with hog cholera, took them to Missouri and sold them in a community sale. As this violated regulations governing the interstate shipment of live stock, the matter is before the federal court.

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"Don't you think," said the young man who was an authority on dogs, "that you ought to have an intelligent animal about the house that would protect you and ——?"

"Oh, Jim!" exclaimed the girl. "This is so sudden."—*Dog World*.

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#### Come to Chicago—August 14-15-16-17-18

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#### PUBLICATIONS RECEIVED

The Viability of the Virus of Swine Fever in Bone Marrow, Muscle and Skin of Preserved Carcasses. T. M. Doyle. Reprint from *Jour. Comp. Path. & Therap.*, xlv (1933), pt. 1, pp. 25-37.

Proteins of the Whey Fraction in Milk from Normal and Abnormal Udders. F. S. Jones and Ralph B. Little. Reprint from *Jour. Dairy Sci.*, xvi (1933), 2, pp. 101-109.

Acid Milk in Bovine Mastitis. F. S. Jones and Ralph B. Little. Reprint from *Jour. Dairy Sci.*, xvi (1933), 2, pp. 111-119.



ANIMAL EXPERIMENTS WITH ADRENAL CORTICAL EXTRACTS.  
J. L. Carr and C. L. Connor. *Ann. Med.*, vi (1933), 9, p. 1225.

A definite connection exists between adrenal insufficiency and such changes in the lymphoid apparatus as regeneration or hypertrophy of the thymus and hyperplasia of the lymphoid elements. In the thyroid an increase in size accompanies adrenal insufficiency. The removal of the thyroid gland extends the postoperative survival period of adrenalectomized animals. Those with adrenal insufficiency are killed by a dosage of thyroid extract which does not affect normal animals. The reproductive system responds to adrenal insufficiency by: a cessation of œstrum, a softening and atrophy of the testicles, abortion or resorption of the fetuses (if insufficiency occurs before the 17th day of gestation), and cessation of lactation. All of these changes apparently operate through the secondary atrophy of the gonads. The authors were unable to prevent any of these changes by administering cortical extract carrying the viable principle. The effect of the extract in normal animals has produced a cessation of the œstrous cycle of rats and degeneration of the ovary of chickens.

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ARTIFICIAL INDUCTION OF OVULATION AND ŒSTRUM IN THE EWE DURING ANŒSTRUM. H. H. Cole and R. F. Miller. *Amer. Jour. Physiol.*, civ (1933), 1, p. 165.

Sixty-one ewes were injected with the gonad-stimulating hormone of mare serum in an attempt to induce ovulation and œstrum during anœstrum. Ovulation was produced by a single injection of 50 R.U. or more of gonad-stimulating hormone. However, using this procedure the ewes did not come into œstrum. If injections were made on several consecutive days the ewes did not exhibit œstrum, but if a second injection followed the first after an interval of 16 days (the œstrous cycle in sheep is about 17 days long) both ovulation and œstrum were produced. A high percentage of fertile matings resulted. In another group in which the second injection was made, 14 instead of 16 days

after the first, only two out of 15 ewes came into œstrum. A third injection, 16 days after the second, resulted in 8 out of 13 ewes coming into œstrum on the second day following injection. The authors conclude that the cyclic phenomena associated with the œstrous cycle are activated by a single injection of gonad-stimulating hormone, but that a second stimulation (injection) must be applied after a specific time interval in order that all of the events associated with œstrum may be manifested.

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**NUTRITIONAL ENCEPHALOMALACIA IN CHICKS.** Elwin M. Pappenheimer and Marianne Goettsch. *Jour. Exp. Med.*, lviii (1933), 3, p. 365.

Nutritional encephalomalacia may be induced in chicks up to the age of approximately two months. As the preliminary feeding period on a natural-food diet is increased, the percentage incidence of the disease becomes progressively less. The average time between institution of diet and appearance of the disease tends to diminish. There is no correlation between growth and incidence of the disease. White Leghorns, Barred Plymouth Rocks, Rhode Island Reds, and White Wyandottes are equally susceptible.

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**EXPERIMENTAL PNEUMOCOCCUS LOBAR PNEUMONIA IN THE DOG.**

I. Method of procedure and course of the disease. Edward E. Terrell, Oswald H. Robertson and Lowell T. Coggeshall. *Jour. Clin. Invest.*, xii (1933), 2, p. 393.

A method has been devised for the production of experimental pneumococcus lobar pneumonia in the dog. This consists of injecting pneumococci, suspended in a starch-broth medium, through a radiopaque catheter inserted into a terminal bronchus with the dog under the fluoroscope. The disease produced with a dose ranging from 0.05 to 0.00,001 cc of highly virulent culture of type I pneumococci ran a febrile course of 3 to 9 days, accompanied by cough, dyspnea, and prostration which usually terminated abruptly. Most of the dogs recovered. The physical signs and X-ray findings were those of lobar consolidation which involved one, two or more lobes. When spread occurred it was most often to adjacent lobes, but occasionally lobes on the opposite side were affected. This infection remained characteristically localized in the lungs. Resolution of the process occurred rapidly, leaving a lung of normal appearance. With larger infecting doses bacteremia and death resulted more frequently and when amounts of culture greater than 0.1 cc were employed

the infection quite regularly became generalized either early or late in the disease. In such animals consolidation of the affected lobes was usually incomplete and pyemic complications were found commonly at autopsy. Experimental lobar pneumonia produced with pneumococcus type II was the same character as that caused by type I.

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EXPERIMENTAL PNEUMOCOCCUS LOBAR PNEUMONIA IN THE DOG.

II. Pathology. Oswald H. Robertson, Lowell T. Coggeshall and Edward E. Terrell. *Jour. Clin. Invest.*, xii (1933), 2, p. 433.

The dogs in which the pathological process remained localized to the lungs throughout the course of the disease showed lesions lobar in character, involving whole and continuous parts of lobes, and had a firm, airless, liver-like consistency. Consolidation of as many as 4 or 5 of the 6 or 7 lobes of the lung not infrequently occurred. Evolution of the lesion in the dog tended to progress so rapidly that the resolution usually occurred before the stage of gray hepatization was reached. Those animals in which the infection became generalized, either early or late in the course of the experimental disease, exhibited an entirely different pathological process. In the fulminating type of infection, characterized by marked bacteremia and early death, the picture was that of a coalescent and lobular pneumonia accompanied by an unusual degree of injury to the tissue. When the generalized infection progressed more slowly and death occurred in 4 to 7 days, with an extreme degree of bacteremia and pyemic complications, the lungs were found to be irregularly consolidated, sometimes partly collapsed. This type was designated as irregular diffuse pneumonia.

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EXPERIMENTAL PNEUMOCOCCUS LOBAR PNEUMONIA IN THE DOG.

III. Pathogenesis. Oswald H. Robertson, Lowell T. Coggeshall and Edward E. Terrell. *Jour. Clin. Invest.*, xii (1933), 2, p. 467.

A series of animals were killed at intervals of 1 to 24 hours following the initiation of the infection. Within one hour after implanting pneumococci into the terminal bronchus, a definite local inflammatory reaction had occurred. With the lapse of time, the lesion showed progressive growth, extending radially from the initial focus. This process was characterized by an advancing zone of edema-filled alveoli, which in turn were gradually invaded by polymorphonuclear leucocytes and red blood-

cells until they were filled and distended by the exuded cells. Peribronchial and perivascular edema was marked. Within 24 hours usually, a whole lobe was consolidated and, at times, spreads to other lobes had occurred. Dispersion of the pneumococci within the first few hours appeared to take place principally through the lung parenchyma, as these bacteria were observed in considerable numbers in the walls of alveoli which appeared normal and lay beyond the margin of the zone of edema. Later the pneumococci also were carried by the edema fluid through the smaller air-passages. Marked regional differences in the distribution of the microorganisms were observed.

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**SPLENECTOMY IN BILE FISTULA DOGS.** F. B. Queen, W. B. Hawkins and G. H. Whipple. *Jour. Exp. Med.*, lvii (1933), 3, p. 399.

A splenectomized dog can be kept anemic for months or years in perfectly good condition. A renal bile-fistula dog on a suitable diet can be kept in perfect health and activity with normal weight for years. When splenectomy and the bile fistula are combined, after a latent period, a striking reaction ensues, with an enormous overproduction of bile pigment, a definite anemia, and finally death from anemia or tissue hemorrhage. The spleen is essential for life in a bile-fistula animal and this suggests some contribution from the spleen to internal body metabolism. The spleen and bile together are essential for the normal metabolism of pigment. The bile salts are suspected of playing some obscure rôle in this reaction. This great excess of bile pigment is difficult to explain as coming from hemoglobin built from the usual diet factors which in these experiments are well standardized.

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**THE CONTROL OF POULTRY COCCIDIOSIS BY CHEMICAL TREATMENT OF THE LITTER.** Justin Andrews. *Amer. Jour. Hyg.*, xvii (1933), 2, p. 466.

The spraying of "toxite" (a chemical preparation consisting of one part of a disinfectant base to nine parts of a light mineral oil) on litter once each week has controlled mixed poultry coccidiosis under conditions of poor sanitation (cleaning once in three weeks) and deliberate contamination. In the continued absence of cleaning, toxite did not protect flocks against coccidial epizootics indefinitely. Its coccidicidal activity apparently was limited by the accumulation of organic matter in the litter. Half-strength toxite applied twice each week in the absence of



cleaning postponed the normal development of coccidial epizootics but not for so long a time as full-strength toxite applied once each week. A water-borne mixture of toxite base, of the same chemical strength as regular toxite, applied each week, in the absence of cleaning failed to postpone the normal development of a coccidial epizootic. Evidence has been adduced which shows that toxite was more active against freshly passed oöcysts than against infective oöcysts.

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COCCIDIOSIS OF THE LIVER IN RABBITS. II. Experimental study on the mode of infection of the liver by sporozoites of *Eimeria steidae*. Hans Smetana. Arch. Path., xv (1933), 3, p. 330.

Sporozoites of *Eimeria steidae* reach the liver from the intestines by way of the portal radicals. This was demonstrated by: (1) morphologic studies of the earliest hours after oral infection; (2) exclusion of the biliary route by ligation of the extra-hepatic bile-duct of one of the lobes of the liver, subsequent to which oral administration of oöcysts was nevertheless followed by infection of all lobes of the liver; (3) coccidiosis of the biliary tract after injection of liberated sporozoites into a mesenteric vein. Puncture of the gall-bladder and examination of the bile for oöcysts appear to be the most reliable method for determining past or present coccidial infection. Biopsy of hepatic tissue alone is not satisfactory unless the process is still active and diffusely scattered throughout the liver.

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EXPERIMENTAL TUBERCULOSIS INFECTION IN TISSUE CULTURE. E. M. Wermel. Abst. Arch. Path., xv (1933), 5, p. 452.

When cultures of adult guinea-pig spleen prepared according to the method of Maximow were infected with living tubercle bacilli, the latter were phagocytosed by histiocytes and polymorphonuclear leucocytes. The leucocytes and some of the histiocytes that had taken up bacilli died. When a histiocyte was able to overcome the engulfed bacilli and maintain its existence, the bacilli were clamped together, surrounded by a vacuole and transformed into a yellowish-brown to dark-brown pigment. Epithelioid cells and giant-cells, both of which were formed readily in the tissue cultures as a reaction to the infection, were not specific types of cells but enlarged macrophages. In Wermel's experiments, a continuing infection of the tissue culture could not be induced. Either the bacilli overcame the tissue cul-

ture and it died or the tissue culture overcame the bacilli and the latter were killed.

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THE EFFECT OF TUBERCULIN ON SPERMATOOZOA FROM NORMAL AND TUBERCULOUS GUINEA PIGS. Lillian C. Donaldson and Arthur J. Vorwald. *Amer. Rev. Tuber.*, xxvii (1933), 4, p. 401.

By the motility test, as used in these experiments, spermatozoa from tuberculous animals could not be shown to be hypersensitive to strong concentrations of tuberculin-protein fraction. The method, therefore, is not a suitable one for testing the potency of tuberculins. Spermatozoa from tuberculous animals are apt to be slightly less motile and to sustain their motility less well in Locke's solution than spermatozoa from non-infected animals. Strong concentrations of synthetic-medium tuberculin caused an initial acceleration of motility in spermatozoa from both normal and tuberculous animals. A like acceleration is caused by similar concentrations of Long's synthetic medium alone, however. This is presumably a non-specific effect, due perhaps to the osmotic pressure of the solutions or to a toxicity of some of the salts present. Strong concentrations of tuberculin cause a rapid decrease in the motility of spermatozoa from both normal and tuberculous animals. A similar but less rapid decrease is caused by equal concentrations of synthetic medium. A carbohydrate fraction derived from tuberculin, and a timothy-bacillus protein likewise lessened motility rapidly. Diphtheria toxin shows no effect on motility of spermatozoa from either tuberculous or non-tuberculous animals other than an acceleration when very strong concentrations were used.

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STUDIES ON THE PATHOGENESIS OF ERYTHROLEUCOSIS. Herbert L. Ratcliff and Jacob Furth (with the assistance of Charles Breedis). *Amer. Jour. Path.*, ix (1933), 2, p. 165.

Under the influence of a filterable agent, the basophile erythroblasts of the sinusoidal capillaries of the marrow undergo unrestricted multiplication. The erythroblasts thus formed fail to mature. They crowd out all other elements of the marrow, secondarily invade the circulation and accumulate in the capillaries of the internal organs where they continue multiplication. Fowls inoculated with material containing erythroleucotic cells showed growth of these cells in the blood-stream and organs at a time when erythroblasts had only partly filled the capillary bed of the marrow. In fowls injected with the cell-free material the blood did not contain these immature cells until the marrow

was almost completely filled by them. With erythroleucosis, thrombocytes in the blood-stream at first are increased and then much diminished or absent. With disturbance of erythrogenesis, formation of thrombocytes is inhibited.

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BRONCHITIS OF BABY CHICKS. Charles S. Gibbs. Poultry Sci., xii (1933), 1, p. 46.

A streptococcus has been found sometimes pathogenic to baby chicks and producing symptoms simulating infectious laryngotracheitis. At necropsy the lesions are found almost entirely confined to the bronchial tubes. The significance of this finding is not realized at present because of the paucity of known epizootics.

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LARYNGOTRACHEITIS IN CHICKS. L. D. Bushnell and C. A. Brandly. Poultry Sci., xii (1933), 1, p. 55.

From the present findings it seems certain that the "gasping" symptom is due to a filtrable virus infection with severe involvement of the larynx, trachea, bronchi and lungs. In a large percentage of the field cases the symptoms are complicated by pulorum disease and occasionally organisms of known or unknown nature. The symptoms and lesions in the chicks are similar to those seen in so-called laryngotracheitis of adult birds and are probably due to the same agent. Typical symptoms have been produced in chicks by intratracheal, subcutaneous, and intraperitoneal injections of filtrate from typical tracheitis in adult birds and again transmitted to adult birds by filtered material from these chicks. Control measures must consist of the removal of carriers, the disinfection and proper sanitary care of equipment, and the quarantine of infected premises.

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EFFECT OF DIETARY AND ENVIRONMENTAL FACTORS ON THE PH OF THE INTESTINAL TRACT. F. E. Mussehl, M. J. Blish and C. W. Ackerson. Poultry Sci., xii (1933), 2, p. 120.

Growing chickens are somewhat able to adapt themselves to a rather wide variation of dietary conditions without a distinct modification of the pH of the material in the digestive tract. Birds apparently are able in some way to maintain a fairly constant pH for each section of the digestive tract, whether the diet is inherently alkaline or acid. The proventriculus or true stomach is definitely acid, but not so much as the gizzard. The fore part of the small intestine is slightly acid while the latter half is approximately neutral.



## Regular Army

Major George W. Brower is relieved from further assignment and duty at Fort Ethan Allen, Vt., effective in time to proceed to New York, N. Y., and sail on transport scheduled to leave that port for San Francisco, Calif., on or about August 25, 1933; upon arrival in San Francisco, Calif., will proceed to Fort Francis E. Warren, Wyo., for duty.

## Veterinary Reserve Corps

### *New Acceptances*

Barber, Percival George..2nd Lt...Carolina, R. I.  
 Blackburn, Loren Cleatus..2nd Lt...Norman, Neb.  
 Bond, Thomas Lenord..2nd Lt...Cumberland, Iowa.  
 Conger, Wilmer I..2nd Lt.....Ionia, Kan.  
 Cottrell, Grant Fuller..2nd Lt....R. R. No. 1, Andover, Kan.  
 Curry, Ray..2nd Lt.....Selma, Kan.  
 Finke, Elmer Fred..2nd Lt.....Buckner, Mo.  
 Gump, Robert Henry..2nd Lt.....Carlton, Kan.  
 Hudson, Claude..2nd Lt.....Gothenburg, Neb.  
 Hudson, Harlow Kenyon..2nd Lt..1126 Bluemont, Manhattan, Kan.  
 Isenberg, Conley Gordon..2nd Lt..208 N. Juliette Ave., Manhattan,  
 Kan.  
 Jurden, Richard Hulett..2nd Lt...3410 College Ave., Kansas City, Mo.  
 Kastner, Charles Manuel..2nd Lt..830 Fremont St., Manhattan, Kan.  
 McGinnis, Velmer Wayne..2nd Lt.Ord, Neb.  
 Nieberding, Joseph Fedelis..2nd Lt.R. R. No. 3, Marysville, Kan.  
 Peck, Eugene Way..2nd Lt.....Falls City, Neb.  
 Prchal, Charles Joseph..2nd Lt....5434 S. 22nd St., Omaha, Neb.  
 Reineccius, Jake Louis..2nd Lt....Creston, Neb.  
 Shaner, Ralph Franklin..2nd Lt...908 Buchanan St., Topeka, Kan.  
 Snodgrass, Wm. Birchard..2nd Lt.Anchorage, Alaska.  
 Thompson, Thomas Marion..2nd Lt.Mulberry, Kan.

### *Promotions*

#### *To*

Doherty, Patrick Joseph..Major...3180 W. 40th Ave., Denver, Colo.  
 McClarren, Robert Lowell..1st Lt.1957 E. Main St., Columbus, Ohio.

Nineteen-year-old Ernest Thomas, a pit boy, saved a pit horse from death at the risk of his life, and has been awarded the Gold Bravery Medal of the National Horse Association of Great Britain. The medal was presented by the Prince of Wales.

## COMMENCEMENTS

### UNIVERSITE DE MONTREAL

Following final examinations on May 16, 1933, at the Ecole de Médecine Vétérinaire de la Province de Québec, Université de Montréal, the degree Doctor of Veterinary Medicine was conferred upon the following:

Doria Charron  
Norbert Demers  
Paul Jacob

Eugène Jobin  
Marc L'Heureux  
Marcel Levert

Three others will be graduated at the end of a second session in September.

### UNIVERSITY OF PENNSYLVANIA

The 177th annual commencement exercises of the University of Pennsylvania were held June 21, 1933. On that occasion the following graduates received the degree, Doctor of Veterinary Medicine, according to Dean G. A. Dick:

Merritt Henry Beere  
Chambers Lawrence Blakely, 2nd.  
(*cum laude*)  
William John Boyd  
Lyman Huntley Champney  
Charles Herbert Chase, Jr.  
Edward Lowell Cole  
Raymond Wynnefield Cook  
Walter Clair Fetherolf  
Alfred Kissileff  
Daniel Friel Leach  
David Wesley Lee  
William Graham Love (*cum laude*)

William Miller Markle  
Francis Earle Martin  
Robert Charles Mehan  
Sidney Jerome Michael  
Clarence Donald Parks  
Harry Keller Royer  
(*cum laude*)  
Raymond Caldwell Snyder  
Ernest Longstreth Stearly  
Milton Daniel Stoudt  
James Gordon Tufts  
George Henry Zacherle, Jr.

The J. B. Lippincott Prize of \$100, for the highest general average for the entire four years of the course, and the T. E. Munce Prize of \$25, for the highest general average in the courses in Animal Husbandry, were awarded to Harry K. Royer.

The Jeannette Blair Prize of \$50, for the best work done in the Small-Animal Clinic, was awarded to Chambers L. Blakely.

The Leonard Pearson Prize of \$50 was awarded to William Graham Love. This prize is awarded to the member of the senior class who has shown that he is most capable of dignifying and advancing veterinary science in research, in practice, in education and in its relation to civilization.

A prize, which consisted of a package of instruments, was awarded to Clarence Donald Parks as the student whose work was outstanding in the Large-Animal Clinics. This prize was given to the School by Dr. George W. Pope through Dr. John P. Turner, of Washington, D. C.



### **EAST TENNESSEE VETERINARY MEDICAL SOCIETY**

The East Tennessee Veterinary Medical Society held a quarterly meeting in Knoxville, June 10, 1933. Twenty veterinarians, including practitioners, and federal and state men, were in attendance.

The address of the evening was made by Dr. A. C. Topmiller, recently appointed State Veterinarian of Tennessee, on "Tuberculosis Eradication and Veterinary Practice in Tennessee." Experiences with some of the recently advertised antiseptics were discussed by the following: Dr. W. A. Jones, of Johnson City; Dr. H. H. Adair, of Bristol, Va.; Dr. F. W. Morgan, of Chattanooga, and Dr. M. Jacob and Dr. G. A. Metcalf, of Knoxville. Some interesting postmortem findings were discussed by Drs. S. A. King and J. A. Sluss, of the local B. A. I. meat-inspection force.

The next quarterly meeting of the Society will be held in September. Plans are being made to have a picnic meeting, so that the veterinarians may bring their families and well-filled baskets.

R. E. BAKER, *Secretary.*

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### **CENTRAL NEW YORK VETERINARY MEDICAL ASSOCIATION**

The twenty-third annual meeting of the Central New York Veterinary Medical Association was held at the hospital of Dr. A. H. Ide, in Lowville, June 15, 1933. The meeting was called to order at 2:30 p. m. by the President, Dr. W. F. Burleigh. Roll call showed 31 members and visiting veterinarians in attendance. Minutes of the previous meeting were read, approved and ordered placed on file. The Treasurer's report was read and referred to the Auditing Committee, after which it was approved and ordered placed on file.

Dr. Joseph Mosher, of Geneva, and Dr. W. W. Trowbridge, of Adams Center, were elected to membership. A rising vote of



thanks was given to Dr. Burleigh for his efficient handling of the office of president during the past year. The following officers were elected for the coming year: President, Dr. M. W. Sullivan, Marcellus; vice-president, Dr. W. M. Long, Baldwinsville; secretary-treasurer, Dr. W. B. Switzer, Oswego (reëlected).

An interesting case report was presented by Dr. W. B. Switzer. Dr. A. H. Ide described the successful treatment of two serious cases of red mange. He also reported great success with a new treatment for purpura.

Dr. George Wohnsiedler reported the occurrence of fluorin poisoning in a large herd of cows. The poisoning caused the bones to soften and the teeth to wear away. The poisoned animals lapped their drinking water and drooled constantly. Dr. Wohnsiedler exhibited the bones of a number of animals so affected and explained the course of the disease.

Dr. Ide presented a case for dental attention. Dr. J. K. Boss-hart operated and removed a small sliver of wood. Dr. Ide also demonstrated a casting harness for cows.

Following adjournment, the gentlemen joined the ladies, who had been entertained by Mrs. Ide, and all journeyed to the General Martin Tavern, at Martinsburg, for the annual banquet. Dr. Burleigh, as toastmaster, introduced Mr. Harold J. Richardson, who made an interesting address. The next speaker was Assemblyman E. M. Sheldon, who reviewed the history of Martinsburg and the General Martin Tavern. Dr. and Mrs. Ide were given a rising vote of thanks for their hospitality.

W. B. SWITZER, *Secretary.*

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### STATE VETERINARY MEDICAL ASSOCIATION OF TEXAS

The tenth semi-annual meeting of the State Veterinary Medical Association of Texas was held at the Worth Hotel, Fort Worth, June 19-21, 1933, with veterinarians from all parts of the State in attendance. More than a hundred members registered during the first two days of the three-day session. Dr. A. H. Flickwir, director of the Department of Public Health and Welfare, delivered the welcoming address. Dr. J. S. Watson, of Mexia, responded.

Three committees went into session at 10 a. m., on Monday. Dr. N. F. Williams, of Fort Worth, president of the American Veterinary Medical Association, headed the Committee on Resolutions; Dr. W. R. McCuiston, of Fort Worth, the Committee on Arrangements, and Dr. J. S. Grove, of Austin, the Committee

on Legislation. Clinics were conducted during the afternoon at a number of the small-animal hospitals throughout the city.

The program included an address by the President, Dr. T. O. Scott, of Waco. Mr. Paul C. Haines, of the State Department of Education, was scheduled to give an address on "Vocational Agricultural Teachers," but he was called out of the city and his paper was read by Dr. L. C. Crabb, State Veterinarian of Texas. Dr. Crabb also told of a meeting of veterinarians and extension service heads held at College Station, where an operating agreement between the extension service and veterinarians was worked out. Dr. H. R. Dugeon, of Waco, spoke on "Organized Medicine and Business in General." He gave valuable advice and criticism as well as some warning that the veterinary profession will do well to heed. Congressman Blanton, of Abilene, was scheduled to speak at the opening of the session on "The Right of Business to Function in a Truly Business Way," but he was unable to be present and his paper was read by Dr. E. F. Jarrel, of Tyler. This paper was very gratifying to those who have fought to protect the rights of the veterinary profession. Dr. Jarrel has been foremost in the fight against the encroachment of the county agent and the vocational agriculture teacher.

Dr. N. F. Williams, in his usual forceful way, presented the subject, "Veterinarians, the Live Stock Industry and Public Health." He was followed by Dr. T. T. Christian, of Waco, with a report on the questionnaire sponsored by President Scott on the infringement of county agents and vocational agriculture teachers in the territory of veterinarians. The replies showed plainly how necessary was the concerted action taken. Dr. R. L. Rhea, of San Antonio, gave an instructive talk on "General Principles of Small-Animal Practice." Dr. H. L. Darby, B. A. I. Inspector-in-charge, Fort Worth, made an enlightening talk on activities of the U. S. Bureau of Animal Industry.

A banquet was held on Tuesday evening, with Dr. W. J. Danforth as toastmaster and principal speaker. This was followed by a dance at Lake Worth.

A paper on "Internal Disintegration and Government in Business," by Dr. L. C. Crabb, was read by Dr. Jarrel. Dr. Jarrel also read a letter from Mr. O. B. Martin, of the Extension Department, saying that its agents had been instructed to refrain from making calls to see sick animals.

Wednesday was devoted to an impromptu program and round-table talks on subjects of current interest to the veterinary profession.

D. PEARCE, *Secretary.*

## CALIFORNIA STATE VETERINARY MEDICAL ASSOCIATION

The annual meeting of the California State Veterinary Medical Association was held at Balboa Park, San Diego, June 19-21, 1933. The following literary program was given:

"Some Swine Diseases and Attempts at Control," by Dr. J. W. Benner, Fontana.

"Swine Disease in San Diego County," by Dr. C. U. Duckworth, Sacramento, and Dr. J. Traum, Berkeley.

"Milk and Dairy Inspection," by Dr. A. P. Immenschuh, Santee.

"The Relation of Nutrition to Abnormalities in Live Stock (Further Observations)," by Dr. George H. Hart, Davis.

"Practical Poultry Disease Control," by Dr. Cliff D. Carpenter, Los Angeles, with a discussion by Dr. R. A. Whiting, San Diego.

"Recent Advances in the Study of Rabbit Diseases," by Dr. F. D. McKenney, Mayo Foundation, Rochester, Minn.

"Observations on Diseases of Captive Wild Animals," by Dr. C. R. Schroeder, San Diego.

"The Clinical Significance of Vitamins and Minerals in the Diet of the Dog," by Dr. John F. McKenna, Los Angeles, and Dr. O. A. Longley, San Francisco.

"Diseases of the Bladder in Dogs and Cats," by Dr. E. R. Sparks, Pomona.

"Specific Foods and Drugs in the Care and Prevention of Dental Diseases in Dogs and Cats," by Miss P. V. Henno, San Francisco.

"Surgery of the Eye in the Dog," by Dr. J. D. Cozzens, Santa Monica.

A picnic lunch at Balboa Park, a trip through the Park Zoo, a boat trip around San Diego Bay and a sight-seeking trip to Coronado and North Island furnished unusually attractive entertainment for members and their ladies.

A special inspection trip to Arden Dairy Farms was arranged by Dr. F. J. Bolender. Lunch, entertainment and bathing in the inspiring surroundings of unique Agua Caliente and Tia Juana were enjoyed on the last day of the meeting.

A dinner dance was held on the evening of June 20 at the San Diego Elks Club.

The following officers were elected for the ensuing year: President, Dr. L. E. Pike, Los Angeles; first vice-president, Dr. R. A. Brunson, Chino; second vice-president, Dr. Oscar J. Kron, San Francisco; third vice-president, Dr. George W. Foelschow, San Diego; treasurer, Dr. W. E. Phelps, Redlands; secretary, Dr. Geo. M. Simmons, San Francisco.

GEO. M. SIMMONS, *Secretary.*

## NORTH CAROLINA STATE VETERINARY MEDICAL ASSOCIATION

The thirty-second annual meeting of the North Carolina State Veterinary Medical Association was held at the Skyland Hotel, Hendersonville, June 28-29, 1933, with 41 North Carolina veterinarians in attendance and 14 from outside the State. The Association has a membership of 71.

Dr. W. L. Boyd, of the University of Minnesota, Saint Paul, Minn., spoke on sterility work in cattle and gave a résumé of his researches in this field at the University. At the large-animal clinic, he enucleated the eyeball of a cow, spayed a mare, and operated on a cryptorchid pig. Dr. C. E. DeCamp, of Nepera Park, N. Y., discussed the use of azamine in infectious diseases in large and small animals.

Dr. C. F. Schlotthauer, of the Mayo Clinic, Rochester, Minn., discussed canine neoplasms and presented several case reports. At the small-animal clinic, several cases of skin diseases were presented, and Dr. Schlotthauer removed a cecum from a dog. A demonstration was given of the urine test for pregnancy, by examining rabbits that previous to the meeting had been injected with positive urine. Virgin rabbits, 14 weeks old, are used in this test. From 5 to 10 cc of urine is injected into the ear vein. Within 36 to 48 hours after the injection, the rabbit is killed and the uterine horns are examined for the reaction.

Dr. Norman J. Pyle, of Pearl River, N. Y., discussed canine distemper and its biological therapy. He emphasized the point that when canine distemper vaccine is used, serum should not be given, as this tends to vitiate the results. The canine distemper virus should be given 14 to 21 days following the vaccine.

Dr. William Moore, of Raleigh, was toastmaster at the banquet. Dr. J. H. Brown, of Tarboro, read a memorial on the life of Dr. O. H. Graham. Mr. F. L. Fitzsimmons, a dairyman of Henderson County, made an excellent talk, scoring the veterinarians in a friendly manner for their failure to let the public know of veterinary achievements. Dr. D. W. Daniels, of Clemson College, S. C., gave a humorous address that was enjoyed greatly by the 85 banqueters.

At the business meeting, a paper was read by Dr. A. L. Hirleman, B. A. I. Inspector-in-Charge, Raleigh, and a timely address was given by the President, Dr. L. J. Faulhaber, of Raleigh. Officers elected for the coming year are: President, Dr. A. H. Williamson, Charlotte; first vice-president, Dr. P. M.

Abernethy, Burlington; second vice-president, Dr. W. A. Carter, Weldon; secretary-treasurer, Dr. J. H. Brown, Tarboro; directors, Dr. R. E. Taylor, Hendersonville, and Dr. H. C. Rea, Charlotte.

J. H. BROWN, *Secretary*.

### NEW YORK STATE VETERINARY MEDICAL SOCIETY

The forty-third annual meeting of the New York State Veterinary Medical Society was held at Albany, June 29-30, 1933.

The meeting was called to order by the President, Dr. W. H. Kelly, and the address of welcome was given by Hon. John Boyd Thacher II, mayor of Albany. A fitting response in behalf of the Society was given by Dr. W. A. Hagan, dean of the New York State Veterinary College. After the President's address, a paper was presented by Dr. L. L. Parker, of Catskill, on "The Attitude of the Private Practitioner to the Poultry Industry," and Dr. Jesse Sampson, of Ithaca, read a paper prepared by Dr. C. E. Hayden on "Ketosis (Acetonemia) in Cows and Ewes." The latter was illustrated with lantern-slides. Following this, Dr. R. S. MacKellar, chairman of the Executive Board of the A. V. M. A., described the activities of the national organization and asked the support of the New York group.

A feature of the afternoon session was an address by Dr. Shirley W. Wynne, Commissioner of Health, New York City, relayed to Albany from New York by means of an amplifying system known as "Televoice." Questions asked Dr. Wynne were answered by him with the same ease as if he had been present at the meeting.

At the annual dinner that evening, attended by about 150, Dr. O. E. McKim, of Port Chester, acted as toastmaster. Brief talks were given by Hon. H. H. Horner, Assistant Commissioner of Education; Dr. W. N. Thayer, Jr., Commissioner of Correction, and others. Musical and vocal selections were enjoyed. A reception and dance followed.

Matters of importance to the profession were considered at the business session of the second day. A large number of cases were presented and demonstrated at the clinic, under the direction of Drs. D. H. Udall, E. L. Brunett, J. N. Frost, and others. Officers elected for the coming year are: President, Dr. H. J. Milks, Ithaca; vice-president, Dr. A. E. Merry, Syracuse; treasurer, Dr. C. E. Hayden, Ithaca (reëlected).

J. G. WILLS, *Secretary*.

## ONTARIO VETERINARY COLLEGE CONFERENCE

The summer conference and semi-annual meeting of the Ontario Veterinary Association was held at the Ontario Veterinary College, Guelph, July 10-13, 1933.

The program of the conference was designed to assist practitioners in their preparations for the Civil Service examination, which will be held throughout the Dominion, August 2. The purpose of the examination is to enable the commission to select practitioners for part-time employment in the control and eradication of infectious diseases, and thus relieve the increasing amount of work thrown on the regular inspectors. It will mean also augmented income for the practitioners selected. The need of such a measure has been felt for some time, and it is hoped that it will be of material benefit to both the live stock industry and the veterinary profession.

The first session opened at 2 p. m., on Monday, and was devoted to a study of the nature, cause and transmission of tuberculosis; and to the nature, cause, diagnosis and control of Johne's disease. Tuberculosis was again the subject for discussion at the session on Tuesday morning, emphasis being given to three phases: the application and interpretation of the different tuberculin tests; the postmortem appearances of tuberculosis, and the regulations relating to tuberculosis for its control and eradication. The afternoon session was featured by a meeting of the Ontario Veterinary Association and clinics.

The morning session on Wednesday was given over to a general review of glanders, dourine, rabies, mange and hog cholera; and to a general review of the Contagious Diseases Act and Regulations. The afternoon session was occupied with a general review of Bang's disease; the use and technic of the agglutination test, and practical demonstrations in the bleeding of cattle for the test. On Thursday morning, anthrax, blackleg, hemorrhagic septicemia and foot-and-mouth disease were reviewed, and in the afternoon, demonstrations were given on the preparation and examination of laboratory specimens and post-mortem technic.

The lectures were given by the members of the staff of the Ontario Veterinary College. Discussions on the various subjects were led by practitioners and others. On Wednesday afternoon, clinical demonstrations, as closely related to the program of study as possible, were held. In the evening of that day, a banquet was given. Matters of interest to the profes-



sion were discussed by Dr. C. D. McGilvray, principal of the College; Dr. J. A. Campbell, of Toronto; Dr. R. Gwatkin, of the Ontario Research Foundation, Toronto; Dr. McQueen, of Pickering, and Dr. H. E. Batt, president of the Ontario Veterinary Association. On behalf of the Association, Dr. W. J. Rumney, of Hamilton, gave a short address of appreciation to the staff of the College for the splendid program prepared for the conference.

R. A. MCINTOSH, *Reporter.*

### VIRGINIA STATE VETERINARY MEDICAL ASSOCIATION

The fortieth annual meeting of the Virginia State Veterinary Medical Association was held at the Stratford Hotel, Fredericksburg, July 13-14, 1933. Approximately 75 per cent of the veterinarians of the State were in attendance. Clinics were held at the Fair Grounds during the afternoons of both days.

The following papers were presented: "The Virus of Equine Encephalomyelitis," by Dr. L. T. Giltner, U. S. Bureau of Animal Industry, Washington, D. C.; "Canine Distemper—Its Biological Therapy," by Dr. Norman J. Pyle, of Pearl River, N. Y. Appearing on the program of the clinic Thursday afternoon were Dr. Charles E. Hagyard and Dr. C. Harold Holmes, of Lexington, Ky., and Dr. E. B. Dibbell, of Baltimore, Md.

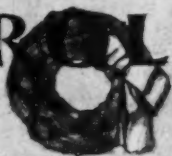
A banquet was held the evening of the first day, Dr. I. D. Wilson, of the Virginia Polytechnic Institute, acting as toastmaster. The address of the evening was made by Dr. J. E. Shillinger, of the U. S. Bureau of Biological Survey, Washington, D. C., and his subject was, "The Veterinarian in Wild Life Protection."

On the second day, the program was opened with an address by the President, Dr. P. M. Graves, Culpepper. This was followed by a business session at which Dr. W. G. Chrisman, of Baltimore, Md., spoke on "Progress in Practice." A clinic was held in the afternoon, with Dr. D. H. Udall, of the New York State Veterinary College, and Dr. E. P. Johnson, of the Virginia Polytechnic Institute, on the program.

Officers for the coming year were elected as follows: President, Dr. S. Taylor Young, Middleburg; first vice-president, Dr. E. H. Drake, Leesburg; second vice-president, Dr. T. P. Rowe, Richmond; treasurer, Dr. R. E. Brookbank, Richmond; secretary, Dr. I. D. Wilson, Blacksburg (reelected).

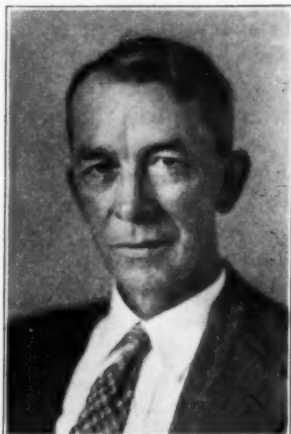
I. D. WILSON, *Secretary.*

# NECROLOGY



## SAMUEL SUTHERLAND BUCKLEY

Dr. Samuel S. Buckley, animal husbandman in charge of swine investigations for the U. S. Bureau of Animal Industry, died at his residence in College Park, Md., on July 6, 1933. Death was caused by pulmonary embolism following a minor operation two weeks previous.



DR. S. S. BUCKLEY

Born at Mount Washington, Md., May 31, 1873, Dr. Buckley received his early education in the Baltimore public schools. He was graduated from the Maryland Agricultural College in 1894, with the degree Bachelor of Science, and received the Master of Science degree from his alma mater five years later. In 1897, he was graduated from the New York-American Veterinary College.

Dr. Buckley was connected with the teaching and research staff of the Maryland Agricultural College and of the University of Maryland Extension Service for a period of 21 years, during which time he served as Professor of Veterinary Science for

the college and for 16 years as veterinarian for the Maryland Agricultural Experiment Station. While at the Maryland institution, Dr. Buckley conducted the original research work on curd as an index of the food value of milk and first brought to light facts regarding the relationship between softness of curd and nutritive value, on which several of the larger dairy companies in recent years have established profitable commercial industries.

In 1918, Dr. Buckley joined the staff of the Animal Husbandry Division of the U. S. Bureau of Animal Industry, with which organization he was associated at the time of his death. For over ten years he worked closely with Dr. Marion Dorset in studies of suckling-pig immunization against hog cholera. Another project of far-reaching consequence, with which he was closely associated, in cooperation with the Johns Hopkins University and the American Dental Association, was that of the relation of diet to the skeletal development of swine with special reference to the development of teeth. At the time of his death his efforts were being devoted mainly to record of performance inbreeding and type studies of swine. He was the author of many technical articles and bulletins on various subjects in the fields of veterinary medicine and animal husbandry.

Dr. Buckley joined the American Veterinary Medical Association in 1906 and always maintained a keen interest in the welfare and advancement of the profession. He was a brother of the late Dr. John S. Buckley, who died about two years ago. Surviving Dr. Buckley, whose wife preceded him in death by three years, are two daughters and one brother.

Dr. Buckley was always active in community affairs. He had been president of his local citizens' association and was a member of the Birmingham Masonic Lodge, of Beltsville, Md. His kindly disposition, his unfailing courtesy and his unselfish devotion to the welfare of others won for him a host of friends and admirers.

C. D. L.

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### THOMAS WATSON UDY

Dr. Thomas W. Udy, of Cumberland, Md., died suddenly, July 2, 1933. His death was due to diabetes and a chronic heart condition, aggravated by a carbuncle. Dr. Udy, who was 57 years old, was graduated from the United States College of Veterinary Surgeons, in 1917, and had been engaged in general practice at Cumberland. He is survived by his widow and one son.

O. K. H.

### GEORGE WATERBURY WHEELER

George W. Wheeler, of Deposit, N. Y., died at his home, July 7, 1933, at the age of 70, after a brief illness.

Before taking up the study of veterinary medicine at the New York State Veterinary College, Dr. Wheeler spent one year at Phillips-Exeter Academy and two years at the Massachusetts Agricultural College. He was 48 years of age when he received his D. V. M., in 1910.

Dr. Wheeler had spent a large part of his professional career in milk inspection work. First, he was associated with the Mutual McDermott Milk Company, and his inspection work took him over most of New York State. Later, he was engaged in similar work for the Dairymen's League. He is survived by his widow, three daughters and one sister.

C. E. H.

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### WALLACE PETER BURY BRENNAN

Dr. W. P. B. Brennan, of Quebec, Que., died at the Jeffery Hale's Hospital, June 15, 1933, after an illness which dated for some time.

Born near Parkhurst, Que., in August, 1871, Dr. Brennan received an elementary school education before entering the Ontario Veterinary College. Following his graduation in 1897, Dr. Brennan practiced with an uncle for a year or so and then located in Quebec where he remained until his death. He conducted the Blue Cross Animal Hospital, and at one time was Official Veterinarian representing the Health of Animals Branch, Canada Department of Agriculture, for the District of Quebec. Dr. Brennan was consulting veterinarian to the Quebec branch of the Royal Humane Society. He was a great lover of horses and it was said of him that there was no one in Eastern Canada who was a better judge. He owned the mare, "Remorseful," with a record of 2.08 for the mile.

Dr. Brennan joined the A. V. M. A. in 1923. He was a bachelor, and is survived by six brothers and two sisters. Interment was at his birthplace near Parkhurst, Que.

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### JOHN WILLMOT

Dr. John Willmot, of Chickasha, Okla., died June 26, 1933, as the result of injuries received by being dragged by a young horse.

Born June 24, 1872, at Rockport, Ind., Dr. Willmot received

his veterinary education at the University Veterinary College, Kansas City, Mo. He was graduated in 1904 and entered practice at Patronville, Ind., where he remained until 1910. He then removed to Chickasha, Okla., where he continued to practice until 1921. Since that time he had been engaged in farming near Chickasha.

Dr. Willmot joined the A. V. M. A. in 1917. He formerly was a member of the Oklahoma State Veterinary Medical Association. He is survived by his widow (née Iona Rasor), a brother, Dr. Dan Willmot (Univ. '04), of Chickasha, and two sisters.

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### JOHN R. ARMSTRONG

Dr. John R. Armstrong, of Carbondale, Ill., died at his home, July 15, 1933, in his 65th year. Bright's disease was the cause of death.

Born in Canada, Dr. Armstrong studied veterinary medicine at the Ontario Veterinary College. Following his graduation in 1893, he located at Carbondale and remained there until his death. Just recently Dr. Armstrong had been appointed an assistant state veterinarian. He was quite prominent in Masonic circles throughout southern Illinois. He is survived by his widow (née Susie McGhee), one son, a sister and five brothers.

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### DANA M. PALMER

Dr. Dana M. Palmer, of Ottawa, Ill., died at his home, July 23, 1933. He was a graduate of the Chicago Veterinary College, class of 1909, and had been located at Ottawa since his graduation. During most of this time he was in general practice, but during recent years he served as a deputy state veterinarian in the Illinois Department of Agriculture. Dr. Palmer was a member of the Illinois State Veterinary Medical Association and of Gamma Chapter, Alpha Psi Fraternity.

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### ROBERT F. FISHER

Dr. Robert F. Fisher, of Paducah, Ky., died at the Fuller-Graham Hospital, Mayfield, Ky., July 24, 1933, after a brief illness.

Born at New Albany, Kan., June 18, 1871, Dr. Fisher attended local schools. After one year of high school, he entered the

Chicago Veterinary College. Following his graduation, in 1906, he located in Paducah, Ky., and remained there until his death. On January 1, 1924, Dr. Fisher was elected City Milk and Meat Inspector of Paducah, by the City Council. At the time of his death he was a candidate for county commissioner of McCracken County.

Dr. Fisher joined the A. V. M. A. in 1917. He was a member of the Kentucky Veterinary Medical Association. He is survived by his widow (née Lottie J. Reid); three daughters; two sons, one of whom, Dr. Milton R. Fisher (O. S. U. '25), is a veterinarian; one brother and two sisters.

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## PERSONALS

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### BIRTHS

To DR. and MRS. P. A. OLAFSON, of Ithaca, N. Y., a daughter, June 4, 1933.

To DR. and MRS. L. C. SCHANTZ, of Lowville, N. Y., a daughter, Carol Anne, June 4, 1933.

To DR. and MRS. C. H. MILKS, of Ithaca, N. Y., a son, Edward Howard, June 13, 1933.

To DR. and MRS. A. M. MILLS, of Goshen, N. Y., a son, George Arthur, June 16, 1933.

To DR. and MRS. EUGENE F. McCUNE, of Tacoma, Wash., a daughter, Kathleen Lenore, July 10, 1933.

To DR. and MRS. C. E. SWINK, of Hibbing, Minn., a daughter, July 11, 1933.

To DR. and MRS. ROY E. WILLIE, of Chicago, Ill., a daughter, Marglene Alice, July 13, 1933.

To DR. and MRS. J. D. RAY, of Kansas City, Mo., a daughter, Margaret Louise, July 17, 1933.

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## PERSONALS

DR. LLOYD TEKSE (Iowa '33) has located at Glencoe, Minn.

DR. WALKER FRANCE (T. H. '13) has located at Boonville, Ind., for general practice.

DR. EDWARD C. JESPERSEN (McK. '16) has removed from Waukesha, Wis., to Neenah, same state.

DR. GEORGE A. FUCHS (San Fran. '12) has removed from Modesto, Calif., to San Jose, same state.

DR. O. D. CAMPBELL (Chi. '11), of Warren, Ark., has been reappointed to the Arkansas Veterinary Examining Board.

DR. G. M. SMALLBONE (Chi. '12), formerly of Long Beach, Calif., reports a change of address to Riverside, Calif.

DR. J. E. SCATTERDAY (Ohio '33) has started practice at Worthington, Ohio. He has opened an office at 965 High St.



DR. M. C. HAWN (Iowa '27), who has been in Minneapolis, Minn., the past year, is now located at Webster City, Iowa.

DR. ANDY CRAWFORD (K. S. C. '30), formerly of East Orange, N. J., has located at New Albany, Miss., for general practice.

DR. CARL V. MCKENZIE (O. S. U. '32) has opened a veterinary hospital at 1174 W. Fifth Ave., Tri-Village, a suburb of Columbus, Ohio.

DR. R. S. ROBINSON (McK. '14), formerly Director of the South Dakota Division of Animal Industry, is now located at Madison, S. Dak.

DR. H. D. BERGMAN (Iowa '10), of Iowa State College, spent the month of July at Shady Shores, Hackensack, Minn., on a well earned vacation.

DR. E. E. HATTON (O. S. U. '17), of Orwell, Ohio, received a fracture of the skull and other injuries in an automobile accident at Hartsgrove, Ohio, on July 7.

DR. HARRY HEDIN (McK. '18), of East Grand Forks, Minn., was elected Commander of the Ninth District, American Legion, at Crookston, Minn., on June 19.

DR. M. A. HOLLINGSWORTH (Ont. '95) has removed from Rock Island, Ill., to Atkinson, Ill., to take over the practice of Dr. A. Swanson (Chi. '13), who has moved to Iowa.

DR. G. W. WORRELL (St. Jos. '17) has been transferred from field work at Stockton, to meat inspection at Dixon, Calif., with the California Department of Agriculture.

DR. J. A. KENNELLY (Chi. '14), of Hartford, Wis., has purchased the practice of Dr. J. E. Hickey (Chi. '13), of Juneau, Wis., who is now Register of Deeds for Dodge County.

DR. R. D. RICE (Chi. '09), of Maple Rapids, Mich., was painfully injured when his automobile turned turtle on the road, about five and a half miles outside of town, the latter part of June.

DR. WM. H. LINDLEY (K. S. C. '33) has taken over the practice of Dr. J. L. Axby (Chi. '03), at Lawrenceburg, Ind. The latter is now in Indianapolis, as State Veterinarian of Indiana.

DR. G. P. MAYER (Chi. '16), formerly of Lansing, Mich., is in the Upper Peninsula for the summer, engaged on tuberculosis eradication work. His headquarters are in Elk Rapids, Mich.

DR. EARL L. KITTRELL (K. C. V. C. '17), of Augusta, Ark., has been appointed a member of the Arkansas Veterinary Examining Board, succeeding Dr. H. J. Hayes (Cin. '10), of Helena.

DR. HERBERT M. TABBUT (Iowa '32), who has been connected with the Department of Anatomy at Iowa State College the past year, has accepted a position with the Animal Rescue League, of Boston, Mass.

DR. WILLIAM A. HICKMAN (Cin. '18), of Covington, Ky., has been appointed part-time milk inspector of the Covington Health Department. The position had been vacant for several months as an economy move.

DR. I. M. HAYS (Iowa '27), who has been a member of the veterinary faculty at Alabama Polytechnic Institute for several years, has resigned and located at Albany, Ga., where he will engage in practice and conduct a research laboratory.

DR. CHARLES M. CARPENTER (Corn. '17) completed the course in medicine at the University of Rochester and received his M. D. at the commencement exercises in June. Dr. Carpenter has accepted an appointment as associate professor of bacteriology and director of the Public Health Laboratories for the City of Rochester and for the Strong Memorial and Municipal Hospitals.

